EA No. 92-033
Docket No. 50-333

APR 17 1992

Mr. Ralph E. Beedle
Executive Vice President - Nuclear Generation
New York Power Authority
123 Main St.
White Plains, New York 10601

Dear Mr. Beedle:

Subject: Enforcement Conference on March 18, 1992 to Discuss Apparent Violations Documented in Inspection Report No. 50-333/91-22

On March 18, 1992, an enforcement conference was held between the NRC and New York Power Authority (NYPA) staffs in the NRC Region I office. The purpose of the enforcement conference was to discuss the apparent violations documented in inspection report 50-333/91-22. After introductions and a brief statement of purpose by the NRC, the meeting was turned over to NYPA for its response to the apparent violations.

NYPA management acknowledged the validity of the DET findings and had responded to the broad programmatic concerns of the DET's evaluation, (reference NYPA letters dated December 19, 1991 and January 3, 1992). Discussions during the conference focused on the circumstances and significance of the apparent violations involving the analog transmitter/trip unit system (ATTS) relays. To address these apparent violations a summary document was provided to the NRC staff and is attached as enclosure 1. A list of enforcement conference attendees is attached as enclosure 2.

In addition to the corrective actions outlined in its summary, NYPA committed to four items in response to concerns raised by the NRC staff during the conference. These commitments were: 1) the programmatic corrective actions identified for the ATTS relay concerns will be incorporated into the FitzPatrick Results Improvement Program; 2) a sampling review of closed operating events report analyses would be conducted prior to unit restart and the results would be assessed to determine if a more comprehensive review is warranted; 3) revised and improved problem identification and resolution programs would be in place prior to unit restart; and 4) a comprehensive review and revision, as appropriate, of NYPA's response to all aspects of Generic Letter 83-28 would be conducted (target completion date not yet specified).

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APR 17 1992

This letter documents the highlights of the March 18, 1992 enforcement conference and the NYPA commitments stated above. If we have mischaracterized any of these commitments please notify us, in writing, as soon as practicable. Absent any response from you or your staff, we will consider these commitments valid, as written. Specific enforcement action taken by the NRC staff will be communicated to NYPA via separate correspondence.

Your cooperation is appreciated.

Sincerely,

ORIGINAL SIGNED BY:

Charles W. Hehl, Director
Division of Reactor Projects

Enclosures:
1. NYPA Enforcement Conference Summary Document
2. Enforcement Conference Attendees

cc w/encls
[illegible]. Bror[illegible], [illegible]ent
R. Co[illegible], [illegible]sident Manager
J. Gr[illegible], [illegible], Nuclear Licensing - BWR
G. Gol[illegible], A[illegible]sistant General Counsel
Supervi[illegible], [illegible] of Scriba
C. Donald[illegible] Esquire, Assistant Attorney General, New York Department of Law
Director, Power Division, Department of Public Service, State of New York
Public Document Room (PDR)
Local Public Document Room (LPDR)
Nuclear Safety Information Center (NSIC)
NRC Resident Inspector
State of New York, SLO Designee
K. Abraham, PAO-RI (2)

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bcc w/encls:
Region I Docket Room (with concurrences)
W. Hehl, DRP
S. Shankman, DRP
C. Cowgill, DRP
R. Summers, DRP
D. Haverkamp, DRP
G. Tracy, SRI - IP-3
W. Cook, SRI - FitzPatrick
R. Lobel, OEDO
R. Capra, NRR
B. McCabe, NRR
W. Hodges, DRS
W. Lanning, DRS
L. Bettenhausen, DRS
C. Anderson, DRS
J. Caruso, DRS
R. Cooper, DRSS
J. Durr, DRSS
J. Joyner, DRSS

RI:DRP	RI:DRP	RI:DRP	RI:DRP
WCook/mjc	DHaverkamp	CCowgill	WHehl
4/14/92	4/14/92	4/15/92	4/17/92

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Enclosure 1

NYPA PRESENTATION

FOR

INSPECTION REPORT 91-22

March 18, 1992

TABLE OF CONTENTS

Statement of Enforcement Items

1. Failure of NYPA to maintain the qualification requirements of the Agastat Trip Relays, on a continuing basis, is an apparent violation (91-22-01) of 10 CFR 50, Appendix B, Design Control, which requires that applicable measures be established to ensure equipment is maintained qualified to perform its safety function.

2. ISP-60, Reactor Protection System (RPS) Time Response Check was inadequate and failed to verify operability of the ATTS RPS System. This is an apparent violation (91-22-02) of 10 CFR 50, Appendix B, Criterion XI, Test Control, which requires surveillance testing to ensure satisfactory in-service performance.

- Introduction
- Methodology
- Specific ATTS Issues/Corrective Actions
- Programmatic Root Causes/Corrective Actions
- Safety Assessment
- Summary

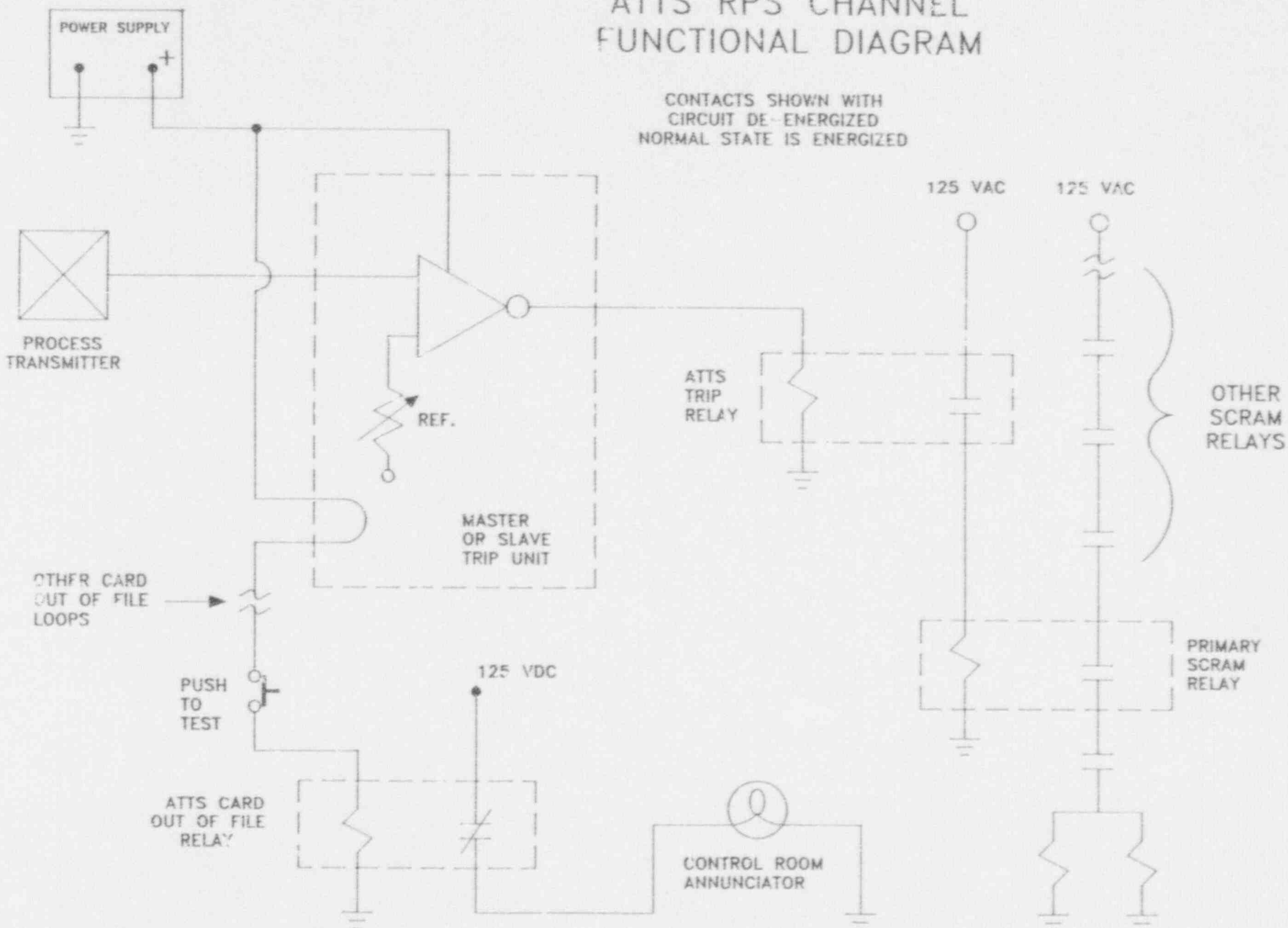
METHODOLOGY FOR EVALUATION OF ATTS ISSUES

- Proven Problem-Solving Technique
- Use of a Dedicated Team with Diverse Backgrounds and Expertise
- Self-Critical Process

ISSUE 1

Degraded Relays in The Analog Transmitter
Trip System (ATTS) May Have Adversely Affected
The Reactor Protection System (RPS) Safety Function

ATTS RPS CHANNEL FUNCTIONAL DIAGRAM



ISSUE 1

Degraded Relays in the Analog Transmitter
Trip System (ATTS) May Have Adversely Affected
The Reactor Protection System (RPS) Safety Function

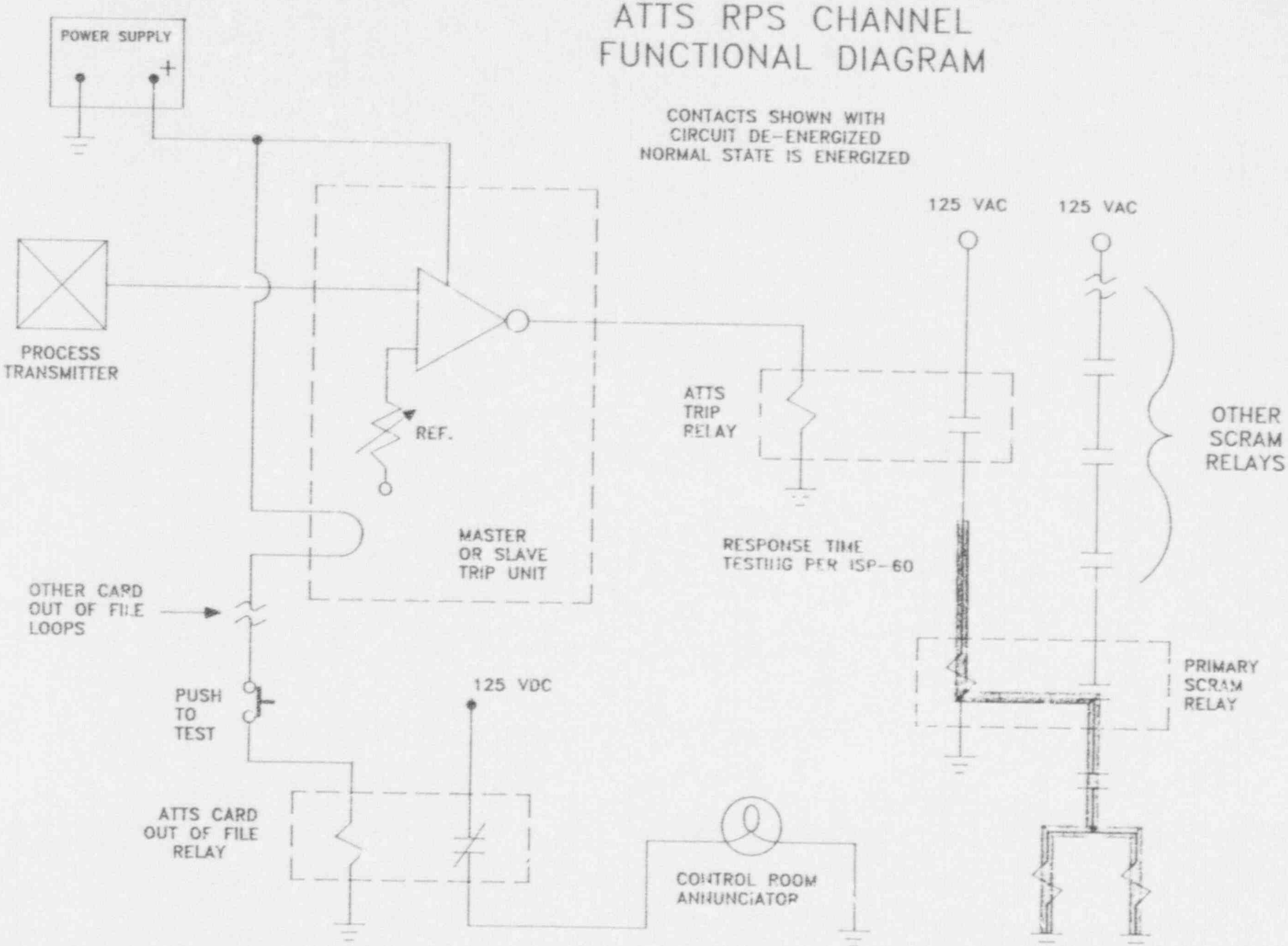
ACTION

- Replace the Subject Relays

ISSUE 2

Surveillance Testing Was Not Adequate

ATTS RPS CHANNEL FUNCTIONAL DIAGRAM



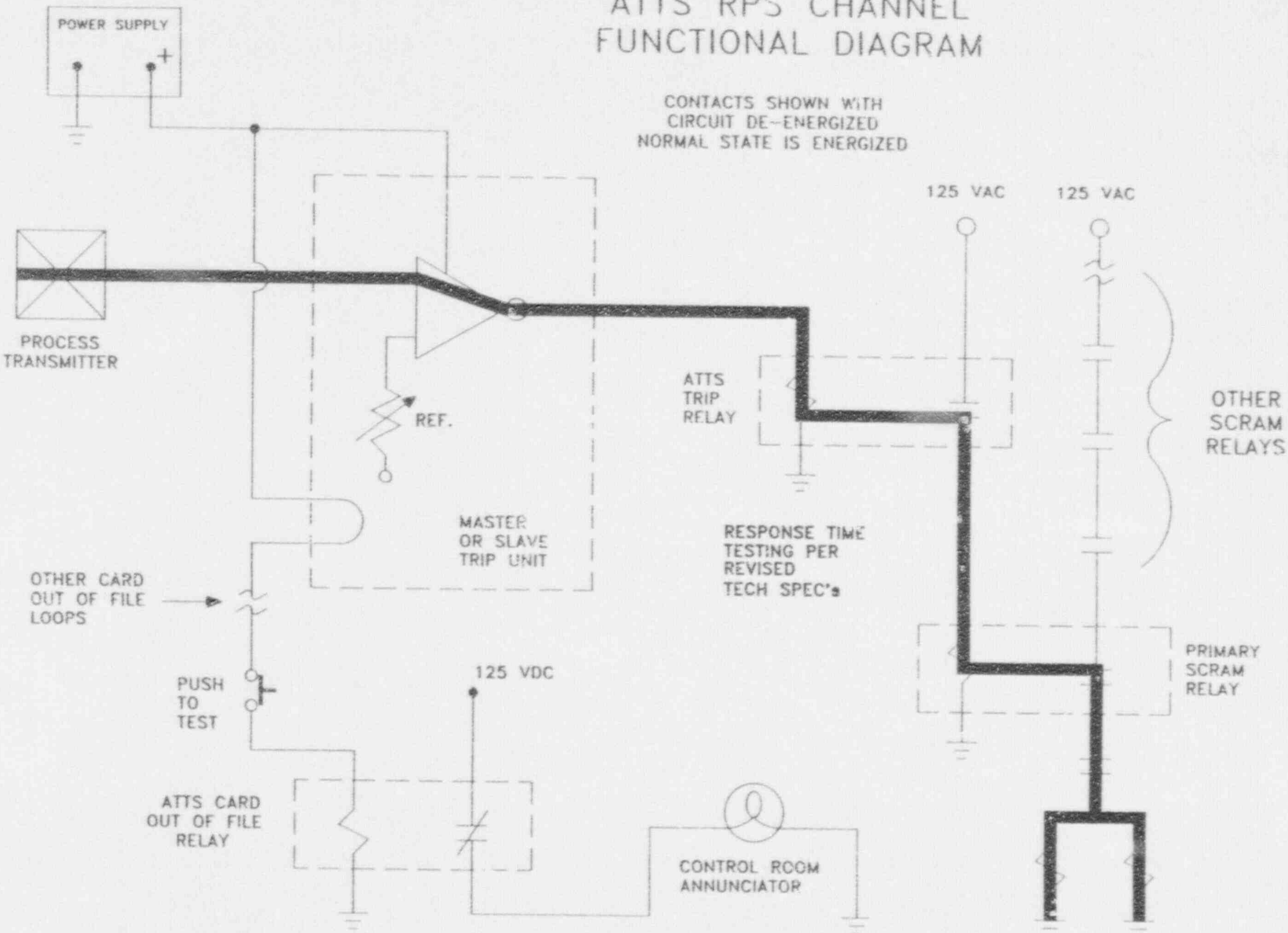
ISSUE 2

Surveillance Testing Was Not Adequate

ACTIONS

- Update Technical Specifications to Meet Licensing Basis
- Develop and Implement Response Time Tests to Meet Technical Specifications as Revised
- Evaluate Need for Additional Response Time Tests and Implement as Necessary

ATTS RPS CHANNEL FUNCTIONAL DIAGRAM



ISSUE 3

Preventative Maintenance Was Not
Adequate to Reduce the Likelihood
of ATTS Relay Failure

10

ISSUE 3

Preventative Maintenance Was Not Adequate to Reduce the Likelihood of ATTS Relay Failure

REASON

- Periodic Replacement of These Relays Was Not Included in the Preventative Maintenance Program

ISSUE 3

Preventative Maintenance Was Not Adequate to Reduce the Likelihood of ATTS Relay Failure

Periodic Replacement of These Relays Was Not Included in the Preventative Maintenance Program

ACTIONS

- Establish Replacement Intervals for Amerace GP-Series Relays
- Incorporate Replacement Intervals into Preventative Maintenance Program

ISSUE 4

NYPA Technical Staff Response to This Challenge Was Weak And Incomplete

ISSUE 4

NYPA Technical Staff Response to This Challenge
Was Weak And Incomplete

REASON

- Actions Were Taken Based Upon Unverified Assumptions
- The Correct People Were Not Dedicated To Resolving The Issues
- The Resources Dedicated Were Not Effectively Managed
- The Scope of The Problem Was Not Completely Identified

ISSUE 4

NYPA Technical Staff Response To This Challenge Was Weak and Incomplete. Actions Were Taken Based Upon Unverified Assumptions.

ASSUMED: Response Time Testing Was Not A Requirement of the ATTS Modification

ASSUMED: Relay Failure Mode Was Armature Binding

ASSUMED: Transient Suppression Diodes Were Part of ATTS Modification

ISSUE 4

NYPA Technical Staff Response To This Challenge Was Weak and Incomplete.
The Correct People Were Not Dedicated To Resolving The Issues

- Licensing - Design Basis For Response Time Testing
- Engineering - Diode Modification and Safety Evaluation
- GE/Amerace - Service Life (Vendor)
- PM - Preventative Maintenance Requirements
- EQ - Qualification Test Reports

ISSUE 4

NYPA Technical Staff Response To This Challenge Was Weak and Incomplete. The Resources Dedicated Were Not Effectively Managed

- No Formal Plan Was Established
- Did Not Resolve Questions With Resident Inspector
    - 50.59 For Diode Modification
    - Seismic Qualification of Diode Modification
    - Seismic Adequacy of Locking Clip
    - EDG Relays Qualified For Safety Related Applications

ISSUE 4

NYPA Technical Staff Response To This Challenge Was Weak and Incomplete.
The Scope Of The Problem Was Not Completely Identified

- **Response Time Testing Commitment Per NEDO 21617-A Was Not Identified**

ROOT CAUSE 1

Ineffective Resource Allocation and Utilization

ROOT CAUSE 1

Ineffective Resource Allocation and Utilization

- No Formal Process For Managing And Resolving Important, Emergent Issues
- Past Insufficient Commitment to Operating Experience Review Process
- Preventative Maintenance Program Upgrade Effort Not Fully Implemented

ROOT CAUSE 1

Ineffective Resource Allocation and Utilization
No Formal Process For Managing And Resolving Important, Emergent Issues

CORRECTIVE ACTIONS

- Integrated Causal And Corrective Action Evaluation Program (WACP 10.1.30, Approved 3/4/92)
- Operations Review Group Staffed By Experienced Personnel Trained in Root Cause Analysis and Problem Solving
- Multi-disciplined Assessment Teams

ROOT CAUSE 1

Ineffective Resource Allocation and Utilization
Past Insufficient Commitment To Operating Experience Review Process

CORRECTIVE ACTIONS

- Eliminate the Operating Experience Backlog
  - Prioritize Backlogged Issues
  - Augment Staff with Qualified Personnel
- Revisit Previously Dispositioned Operating Experience
  - Selection of Items for Re-Evaluation Based Upon Identified Significant Issues

ROOT CAUSE 1

Ineffective Resource Allocation and Utilization
Preventative Maintenance Program Upgrade Effort Not Fully Implemented

CORRECTIVE ACTIONS

- Expanded Preventative Maintenance Upgrade Scope To Include Instrumentation and Controls Equipment
- Expanded Staff
- Accelerated Preventative Maintenance Evaluations Of Plant Component Types

ROOT CAUSE 2

Ineffective Organizational And Programmatic Interfaces

ROOT CAUSE 2

Ineffective Organizational and Programmatic Interfaces

- **Modification F1-82-053 Failed To Identify ATTS Relay Replacement Intervals And Response Time Testing Requirements**
    - ° No Requirement To Check Operating Experience
    - ° No Process For Review And Incorporation of Vendor Technical Documentation

- **Technical Specifications And Response Time Testing Not In Accordance With the ATTS Design Basis**
    - ° Inadequate Review of NEDO 21617-A

- **Operating Experience Evaluations Were Limited In Scope**
    - ° Inexperienced Evaluators
    - ° Inadequate Documentation
    - ° Superficial Interpretation
    - ° Untimely Reviews

ROOT CAUSE 2

Ineffective Organizational And Programmatic Interfaces

CORRECTIVE ACTIONS

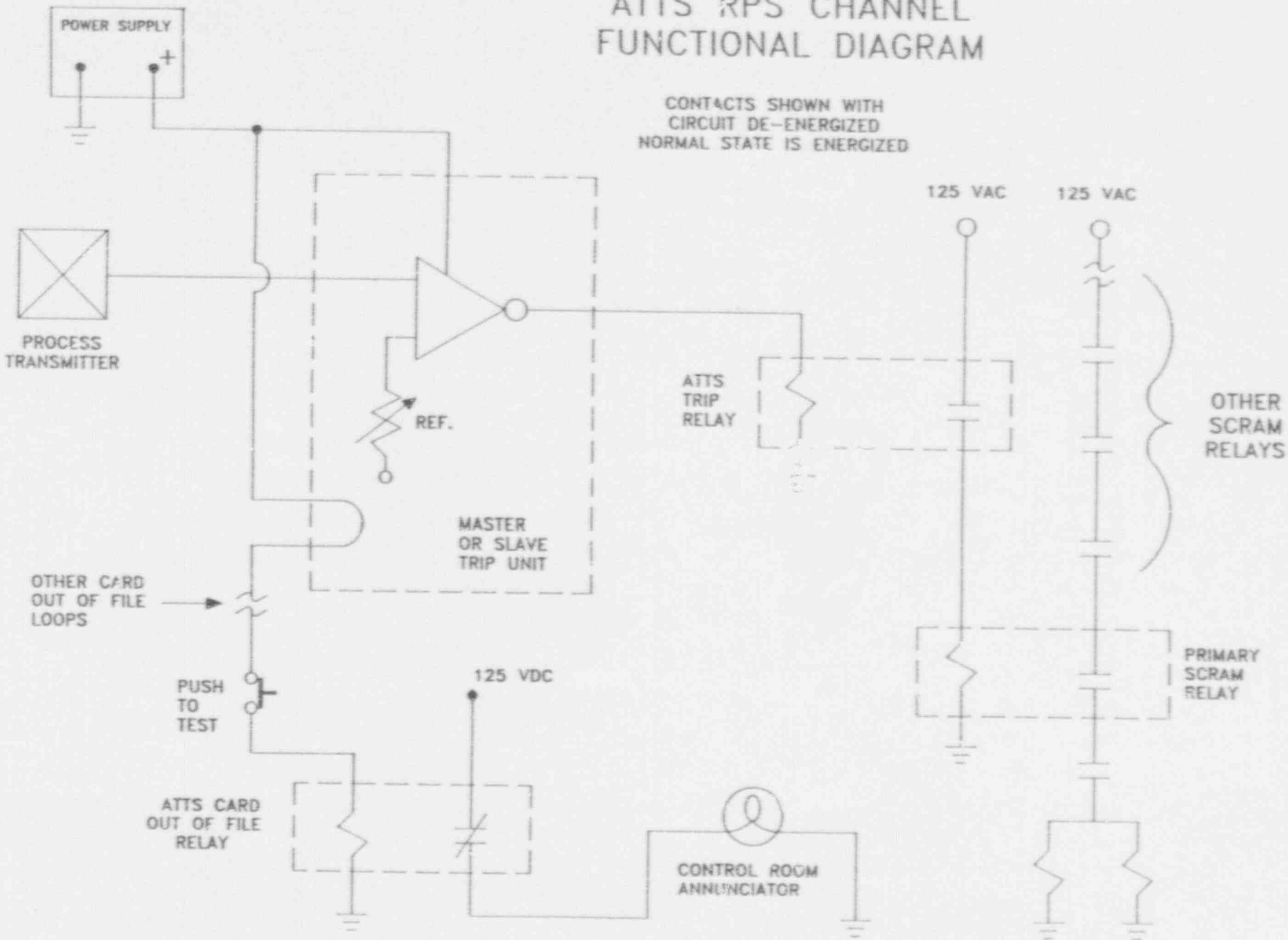
- Revise The Modification Process To Provide Specific Guidance And Criteria For Evaluation of:
  - Effect On Design Basis And Technical Specifications
  - Impact On And Required Additions To The Preventative Maintenance Program
  - Effect Of Existing Industry Experience On Added Equipment
- Revisit A Sample Of Modifications To Equipment Having The Potential To Affect The Design Basis

SAFETY ASSESSMENT

- Failure Analysis of Normally Energized Relays Indicates High Contact Resistance.
  - NYPA In-House Tests
  - Failure Prevention Incorporated (preliminary data)
- NYPA Response Time Tests of Normally Energized Relays Indicates that Relay Drop-Out Times are all Within Design Specifications.
  - No Relay Armature Binding was observed.
- Full Channel Response Time Measurements of 4 Reactor Protection System Channels Indicates That The Instrument Channel Response Time is Within The Design Basis Requirement (using original 1979 date code relays)
  - The maximum measured value was 173 msec.
  - The most restrictive design basis response time requirement is 550 msec for ATTS channels.

ATTS RPS CHANNEL FUNCTIONAL DIAGRAM

CONTACTS SHOWN WITH
CIRCUIT DE-ENERGIZED
NORMAL STATE IS ENERGIZED



The Test Results Indicate That The Previous Lack Of Channel Response Time Testing Does Not Represent A Significant Safety Concern, Based On The Most Restrictive RPS Response Time Operability Requirements

SUMMARY OF CORRECTIVE ACTIONS

• Replace Amerace GP Series Relays in ATTS	*Prior to Startup*
• Update Technical Specifications To Meet Licensing Basis	*Prior to Startup*
• Develop and Implement Response Time Tests To Meet Revised Tech. Specs	*Prior to Startup*
• Evaluate Need for Additional Response Time Tests And Implement As Necessary	*Prior to Startup*
• Establish Replacement Intervals for Amerace GP-Series Relays	*Prior To Startup*
• Evaluate Specific QA Cat. I Equipment in Mild Environments For Available Service Life Data	*Prior to Startup*
• Incorporate Replacement Intervals Into Preventative Maintenance Program As Identified	*(Continuous)*
• Establish a Formal Process for Managing and Resolving Important/Urgent Issues	*Prior to Startup*
• Eliminate Operating Experience Backlog	*(12-18 Months)*
• Revisit Previously Dispositioned Operating Experience	*(Continuous)*
• Expand Preventative Maintenance Upgrade Scope to Include I&C	*(In Progress)*
• Accelerate Preventative Maintenance Evaluations of Plant Components	*(In Progress)*
• Revise Modification Process	*(In Progress)*
• Revisit Sample Of Plant Modifications	*(12-18 months)*

The Results Improvement Program Root Causes Have Been Confirmed

SIGNS OF IMPROVEMENT

- ATTS Relay Problem Was Self-Identified
- Outage Risk Assessment
- Vessel Decontamination/Delay Of Outage
- Vessel Disassembly
- Many Programs Have Been Accelerated
  - Pipe Hangers
  - Labeling
  - Operating Experience Backlog
  - Preventative Maintenance
- Operating Experience Evaluations More Comprehensive

RESPONSE TIME

TESTING OF AGASTAT

MODEL GP RELAYS

PREPARED BY: R. BAKER

NEW YORK POWER AUTHORITY
JAMES A. FITZPATRICK NUCLEAR POWER PLANT
INVESTIGATION AND TESTING OF AGASTAT MODEL FGP RELAYS PREVIOUSLY INSTALLED IN THE ANALOG TRANSMITTER TRIP SYSTEM

TABLE OF CONTENTS

I. BACKGROUND

In January 1992, age-related degradation of two Agastat Model FGP relays installed in the Analog Transmitter Trip System (ATTS) was observed. A representative sample of FGP relays were removed from service, inspected, and tested by NYPA. The results of those inspections and tests are presented herein.

In addition, a number of ATTS relays were forwarded to Failure Prevention, Inc. (FPI) for independent test and inspection. The results of the FPI investigation will be reported separately.

II. PROBLEM IDENTIFICATION, INVESTIGATION, AND SHORT-TERM CORRECTIVE ACTIONS

During routine ATTS surveillance testing, unexpected response was observed in two circuits which provide ATTS status and annunciation in the Control Room. Subsequent investigation indicated the Agastat relays employed in those two circuits were the likely cause of the observed test anomalies.

The two "suspect" relays were removed from service, inspected, and disassembled; and the following observations made:

1. A deposit of a varnish-like material had condensed on the relay internals.
2. The coil leads and coil glass tape were discolored. The coil leads appeared to be singed where they contacted the metal frame of the relay.
3. The coil form (bobbin) was found to be cracked and discolored.
4. The cylindrical portion of the coil form was found to be broken.

The observations were recognized as evidence of a heating condition and thermal degradation of the relays. Noting the two relays were normally energized, as were ATTS relays in the Reactor Protection System (RPS) and Primary Containment Isolation System (PCIS) functions, the decision was made to replace an additional twenty-three (23) relays in normally energized service. Sixteen (16) of the relays were in safety-related functions and seven (7) in "annunciation" functions. The replacement relays were normally deenergized spares which exhibited none of the observed physical degradations apparent in the two relays which had been disassembled.

A normally deenergized relay was removed from service, visually inspected, and disassembled. Outwardly, the relay appeared as if recently manufactured. There was no evidence of thermal degradation, even under a sixty-power microscope.

Review of plant documentation and industry operating experience information indicated the ATTS relays had exceeded their (vendor) recommended service life. Concern that the broken coil form could prevent or delay relay plunger movement, a review of vendor literature was initiated. As a result of that review, which identified the fact that the same coil was used in other Agastat relay series, four additional (non-ATTS) relays were replaced. The additional relays were in 120V AC, normally energized circuits in the Emergency Diesel Generator (EDG) fuel oil transfer pump automatic start circuits for the "A" and "C" EDGs.

III. RELAY TESTING

A. Pre-Test Visual Inspection

The ATTS and EDG relays which had been in normally energized service, all (visually) appeared to have some extent of thermal degradation. All of the twenty-seven (27); twenty-three (23) from the ATTS, and four (4) from the "A" and "C" EDGs were tested. A total of four (4) normally deenergized ATTS relays were removed from service, inspected, and tested.

B. Test Configuration

A response time test procedure was developed and a test fixture constructed (Refer to Attachment A for details). Initial testing of eleven (11) normally energized relays was performed. Ten (10) out of the eleven (11) relays "failed" due to high contact resistance of contacts which were normally open when the relay is energized. (***Note:*** The relay contacts which provide inputs to the RPS and PCIS actuation logics are closed when the relay is energized and open to perform their safety function.)

Suspecting the observed results were attributable to the test technique, testing was discontinued. A review of the manufacturer's specifications for logic and power relays were initiated. That review indicated logic relays are energized at 125V DC at a load current of 2.5 milliamps, measured contact resistance is 125 milliohms; and power relays are energized at 125V DC at a load current of 1 amp, measured contact resistance is 250 milliohms.

Re-configuration of the test device eliminated three factors which complicated the first test sample and prevented accurate measurement of relay capability. The three factors were:

1. The relay operated very fast, less than 3 milliseconds.

2. Energy is stored in the coil when it is energized.

3. Contact resistance due to varnish film.

Factors 1 and 2 are tied together. In the original test configuration, it took longer to dissipate the stored energy in the coil to a level that the timer could recognize deenergization, than for the contacts to open. To overcome this problem, an interposing relay was used. This method allows the timer to recognize the instant the coil is deenergized. Problem 3, that of high contact resistance, was overcome by putting a current load on the contact being timed. This load current was equivalent to the burden current of an HFA relay in the RPS that the ATTS relay drives.

Measuring contact resistance to the manufacturer specification required a 4,800Ω 3-watt resistor, and a 125 , 125 watt resistor, respectively. Since this equipment was not available to perform this test, the equivalent load current for the RPS HFA relay was used. RPS relays operate at 120V AC at a burden of 32VA. Therefore, the contact current is 260 ma. Considering contact resistance to be independent of energizing potential, the contacts were energized at 24V DC for safety reasons and loaded at 226 ma through a 1,000Ω load resistor. The contact resistance was calculated by measuring the potential drop across the contact and dividing by the measured current flow.

C. Normally Energized Relays - ATTS

The tested response time of twenty-one (21) of the ATTS relays was superior (faster) than that published by the manufacturer. Although measured contact resistance was higher than specified by Agastat, that observation is consistent with the "varnish" coating film previously discussed.

The two remaining ATTS relays exceeded the manufacturer's specified response time and exhibited high contact resistance. Both relays operated mechanically causing us to re-think whether coil form cracking or breakage was the failure mechanism originally attributed to the first two "suspect" relays. It was also noted both the two original suspect relays and the two relays which exceeded the manufacturer's specified response time during testing were previously in "annunciation" type circuits and not in safety-related RPS or PCIS circuits.

Normally Energized Relays

All four EDG relays exhibited superior response time during testing when compared to the manufacturer's specifications. All four exhibited high contact resistance.

D. Normally Deenergized Relays

Four (4) normally deenergized relays were tested. All relays had better response times than manufacturer's spec. One of the four relays was damaged from a fall. All four (4) relays had degraded contact resistance. The contact resistance values ranged from .07 ohms to a high value of 8.3 ohms.

A new relay was tested for contact resistance. Contact resistance was measured using two methods, measuring contact resistance using an ohm meter, and calculating contact resistance by the voltage drop method. Both methods showed the contact resistance of the new relay to be less than manufacturer values. The degraded contact resistance of the normally deenergized relays is most likely due to oxidation of the silver contact surfaces.

IV. ANALYSIS OF TEST RESULTS

All sixteen (16) normally energized ATTS relays, which had been removed from safety-related circuits, exhibited superior response time. Five (5) of the seven (7) relays removed from "annunciation" circuits also exhibited superior response time. All of the relays exhibited high contact resistance and all operated mechanically. The high contact resistance is attributable to the formation of a film of "varnish" on the contacts -- "varnish" having been produced during relay "off-gasing" and subsequent condensation on the internal components of the relay. The resistance was worse on the normally open contacts, particularly of those relays which had been in "annunciation" circuits when the relay is energized.

Normally energized EDG relay response time was also superior to the manufacturer's specification. Contact resistance was high. Again, the highest resistance being measured on normally open (spare) contacts when the relay is energized.

The measured response time of normally deenergized ATTS relays was superior to the manufacturer's specifications.

V. CONCLUSIONS

1. ATTS relays that provided signals to the RPS and PCIS HFA relays were degraded in physical condition and electrical contact resistance. Relay response (time) was better than published data. The relays were operational and capable of fulfilling their safety functions.

2. ATTS relays that provided signals to annunciator windows were degraded and did not provide operational reliability of the annunciator.

3. EDG relays were degraded in physical condition and electrical contact resistance. Relay response (time) was better than published data. The relays were operational and capable of fulfilling their safety functions.

VI. ATTACHMENTS

A. Response Time Testing Procedure

B. Data Sheet Summary

C. Agastat Manufacturer Data

1.0 **PURPOSE OF TEST**

1.1 To test the response time of Agastat Model GP Relays.

2.0 **APPLICABILITY**

2.1 Testing concerns three groups of relays:

2.1.1 *Group I:* - Those relays in the ATTS which are normally energized, having exceeded their service life of 10 years and their energized life of 3.5 years.

2.1.2 *Group II:* - Those relays in the ATTS which are normally deenergized and have exceeded their service life of 10 years.

2.1.3 *Group III:* - Those relays in the EDG Fuel Oil Transfer Control System which are commercial grade.

3.0 **TEST CONSIDERATION**

3.1 *Ambient Temperature:* - The relays will be tested at room temperature.

3.2 *Relay Position:* - Relays will be tested in horizontal position.

3.3 *Normally Energized:* - These relays will be tested without pre-energizing the relays to heat the coils. Selected relays may be tested at elevated temperatures to test effect.

3.4 *Normally Deenergized:* -

3.5 Test one relay at a time to prevent interaction between the coils which may effect the (TC) time constant of the circuit.

3.6 Use a Multi-Amp EPOCH V Timer.

Timer resolution: .1 msec.

3.7 Relay contacts will be energized at 24 VDC and loaded to a current of 250 milliamps. The timer stop signal will be changed. NC contact will become voltage applied and NO contact will become voltage removed.

4.0 **TEST EQUIPMENT**

4.1 Multi-Amp EPOCH V Timer

4.2 Sorrenson variable DC power supply

4.3 Fluke DVM

4.4 Relay test board

4.5 List test equipment on data sheet

5.0 **PROCEDURE**

5.1 Normally energized relays will not be energized prior to response testing. Selected relay may be tested later.

5.2 Normally energized relays can be distinguished from normally deenergized relays from their appearance. Normally deenergized relays are new in appearance.

5.3 Each relay has four (4) sets of a Form C contact, i.e., one normally closed and one normally opened contact. Two sets will be tested, then the relay will be unplugged, turned over, and plugged in. The remaining two sets of contacts can be tested.

5.4 Timer set-up

5.4.1 Turn power ON.

5.4.2 Select seconds. Seconds LED ON.

5.4.3 Press latch pushbutton until both LEDs are ON.

5.4.4 Start and stop logic in accordance with data sheet.

5.4.5 Test connection in accordance with data sheet.

5.5 Relay test in accordance with data sheet.

5.5.1 Record relay model number on data sheet.

5.5.2 Record relay serial number.

5.5.3 Group Nos. I, II, or III.

5.5.4 Device ID if known. This is the location ID given on drawing. Record only if information is available.

5.5.5 Date and tester name.

5.5.6 Plug relay in socket with name plate up.

5.6 Set-up PS

5.6.1 Ensure PS leads the black and white wire are not touching.

NOTE: 24 VDC is the highest voltage supplied to the relay test fixture. A shock from inductive kick is possible.

5.6.2 Turn ON power supply.

5.6.3 Adjust PS voltage; adjust for 25V.

5.6.4 Connect the white lead to Terminal 11.

5.6.5 Connect the black lead to Terminal 12.

5.6.6 Toggle switch ON; relays should be heard operating.

5.6.7 With switch on, measure voltage at Terminal 11 to 12. Adjust PS for 24 volts. Measure and record voltage on data sheet each time a different relay is tested.

5.7 Testing in Accordance with Data Sheet

5.7.1 Start test with relay name plate up.

5.7.2 Turn name plate over to test the other set of relays.

6.0 **SKETCH**

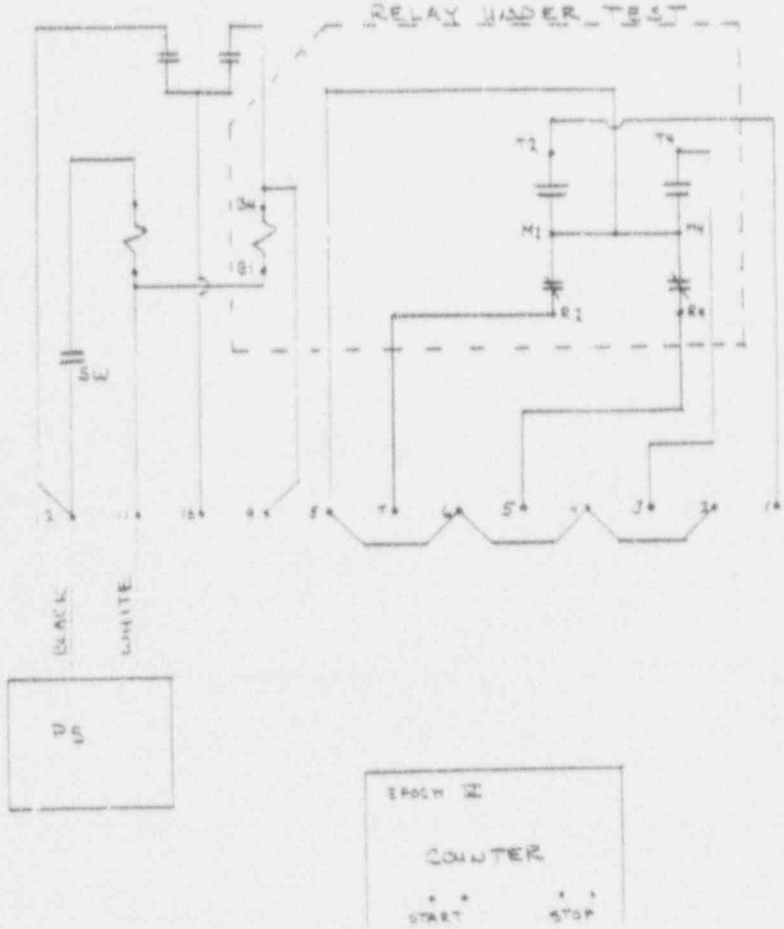
6.1 Wiring Drawing - Sketch A

6.2 Data Sheet- Sketch B

6.3 Test Equipment Log - Sketch C

Response Time Testing of Agastat Model GP Relays

WIRING DRAWING - SKETCH A



02/11/92

Revision to Section 3.7 of the Agastat Test Procedure

Page 1 Will Become Revision 1

The reason for the revision is as follows:

During testing of the relays, erratic response times and failure to operate were encountered. Visual observation showed the relay was operating and the contacts were making.

Resistance readings of closed contacts with a Fluke DVM indicated a contact resistance varying from ohms to hundreds of ohms. The same contacts are used by the timing device to measure response times. The high contact resistance interfered with the instrument's ability to measure response times.

A review of manufacturer's specs indicate that contact resistance is measured at a potential of 125 volts and a load current of 1 amp or 2.5 milliamps depending on relay service, i.e., power control on logic control.

The problem is caused by an oxide film or the film that condensed on the surfaces due to the energized coil.

Since the majority of the energized relays drive HFA relays and the manufacturers' specs imply a current load to maintain contact resistance, technical justification exists to load the contacts.

The coils of the RPS HFA relays provide a burden of 32 VA at 60 HZ, 120 volts. This causes a current of ≈260 milliamps. The contacts were loaded at an equivalent load of 250 milliamps using a 100Ω resistor and a 24 VDC power supply.

The timer has the ability to monitor an energized contact.

Relays tested so far operated satisfactorily with repeatability.

ATTACHMENT B
NEW YORK POWER AUTHORITY
JAMES A. FITZPATRICK NUCLEAR POWER PLANT
INVESTIGATION AND TESTING OF AGASTAT MODEL FGP RELAYS
PREVIOUSLY INSTALLED IN THE ANALOG TRANSMITTER TRIP SYSTEM

DATA SHEET SUMMARY

DATA SHEET 1A, GROUP I

A test to measure contact resistance using the voltage drop/current method and calculating the resistance.

DATA SHEET 2A, GROUP I

A response test of a Group I relay from ATTS which drives an annunciator window. High contact resistance is the cause of mis-operation of the timer.

DATA SHEET 3J, GROUP I

Response test o.k. with loaded contacts. Sheet 3J-1 contacts not loaded; mis-operation.

DATA SHEET 4

Manufacturer published response times.

DATA SHEET 5A, GROUP III

Response time testing - high contact resistance caused mis-operation of timer.

DATA SHEET 6

Response time testing relay plugged in a Rosemount bench test fixture. Note: De-energized time has increased.

DATA SHEET 7D, GROUP II

Response time testing - response time o.k.

DATA SHEET 8D, GROUP II

Contact resistance using voltage drop/current method.

DATA SHEET 9, NEW RELAY

Contact resistance using ohm meter and the voltage drop/current method.

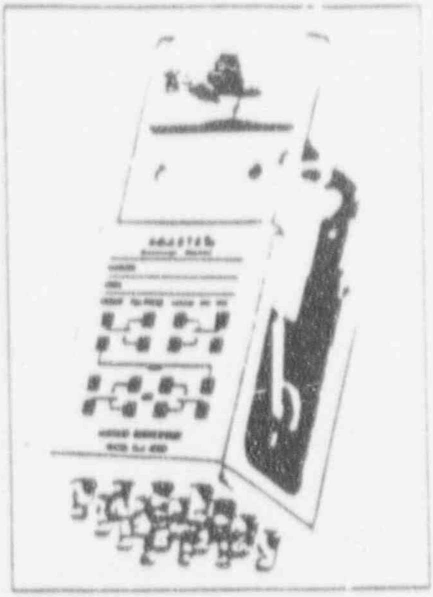
ATTACHMENT C

A-28-07

series GP | ML | TR control relays

power/ logic relay | magnetic latch | time delay

Among the advances AGASTAT Control Relays offer over existing designs is a unique contact operating mechanism. An articulated arm assembly amplifies the movement of the solenoid core, allowing the use of a short stroke coil to produce an extremely wide contact gap. The long support arms used in conventional relays are eliminated. Both current capacity and shock/vibration tolerance are greatly increased, as well as life expectancy.



Series GP Power Relay

Features

The AGASTAT Control Relay is suitable for all demanding industrial applications. The GP relay occupies a very small panel space and may be mounted singly, in continuous rows or in groups.

The relay is available with a screw terminal molded socket.

A magnetic blow-out device increases the DC current carrying capacity approximately ten times for both N.O. & N.C. contacts. In both AC and DC operation, the addition of this device will normally double the contact life, due to reduced arcing.

Design/Construction

AGASTAT Control Relays are operated by a moving core electromagnet whose main gap is at the center of the coil. A shoe is fitted to the core which overlaps the yoke and further increases the magnetic attraction.

The coil itself is in the form of an elongated cylinder, which provides a low mean turn length and also assists heat dissipation. Since the maximum travel of the electromagnet does not provide optimum contact movement, an ingenious amplifying device has been designed.

This consists of a W-shaped mechanism shown in figure 1. When the center of the W is moved vertically the lower extremities move closer to each other as can be seen in the illustration. The center of the W mechanism is connected to the moving core of the electromagnet and the two lower points are connected to the moving contacts.

Two of these mechanisms are placed side-by-side to actuate the four contact sets of the relay. The outer arms of the W mechanisms are leaf springs, manufactured from a flat piece of non-ferrous metal. These outer arms act as return springs for their corresponding contacts. This provides each contact with its own separate return spring, making the contacts independent.

The mechanical amplification of the motion of the electromagnet permits a greater distance between the contacts, while the high efficiency of the electromagnet provides a nominal contact force in excess of 100 grams on the normally open contacts.

All the contacts are positioned well away from the cover and are well ventilated and separated from each other by insulating walls.

The absence of metal-to-metal friction, the symmetrical design of the contact arrangement and the lack of heavy impacts provides a mechanical life of 100,000,000 operations.

For use in AC circuits, the relay is supplied with a built-in rectification circuit, thus retaining the high DC efficiency of the electromagnet. The current peak on energizing is also eliminated and consequently the relay can operate with a resistance in series (e.g. for high voltages or for drop-out by shorting the coil). The use of the rectification circuit offers still other advantages. The same model can operate at frequencies ranging from 40 to 400 cycles. Operation of the relay is crisp, even with a low AC voltage, there is a complete absence of hum and vibration.

The plastic dust cover has two windows through which the iron yoke protrudes to facilitate cooling and also to allow direct mounting of the relay irrespective of the terminals.

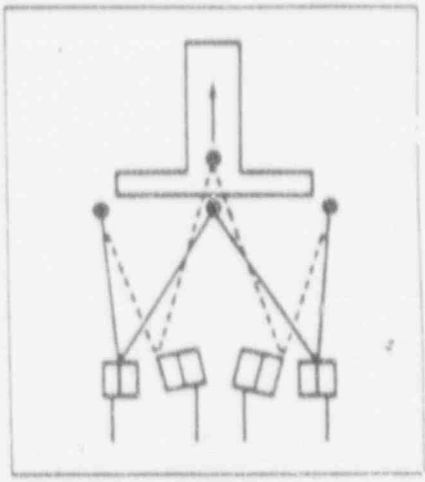


Figure 1

Diagram illustrates amplification obtained by articulated operating mechanism.

Series GP Logic Relay

This relay is identical in design and construction to the standard GP power relay, except that the logic relay has gold plated movable and stationary contacts. Amerace Corporation recommends the use of gold plated contacts in low voltage, low current control applications. Sockets with gold plated contacts must be used in conjunction with the Series GP logic relay to ensure optimum low level load switching.

series
GP/ML/TR
control relays

Series ML Magnetic Latch

Features

The Series ML mechanically held relays offer exceptional reliability and high contact density. They are suitable for applications where relays must be kept operating even in the event of supply voltage failure.

Design/Construction

The AGASTAT Series ML relay has a single solenoid with a plunger core and characteristic GP type mechanical amplification. A magnet within the structure is polarized by the latching winding and holds the relay in the operated position after the energizing voltage is removed. Unlatching winding, which is wound in the opposite direction, neutralizes the polarity of the magnet and returns the relay to the unoperated position. Similar control may be obtained on AC circuits by means of built-in rectification.

The ML Relay therefore forms a magnetic storage device having contacts on both of the stable positions. Impact vibration or external stress will not cause the relay to transfer. This holding force compares favorably with similar mechanical devices and will withstand quite severe treatment.

In a DC circuit with a single wound coil switching contacts would be necessary to change the current direction. This is the reason for the provision of a double wound coil, the latching winding being energized through the B1-B4 terminals and the de-magnetizing or unlatching winding through the B3-B4 terminals.

Since the double-wound coil does not have a continuous duty rating, voltage pulses to the coils should not exceed a ratio of 40% on, 60% off, with maximum power-on periods not to exceed 10 minutes.

If continuous energizing only is available, a resistor/capacitor network should be connected as shown in figure 2. In this case the shortest time between two operations must not be less than 5 seconds.

In an AC circuit the unlatching winding may be energized continuously. The resulting slight hum is not loud enough to be objectionable.

The relays are normally delivered polarized so that terminal B4 carries the negative voltage. To reverse the polarity, a deenergize/energize cycle should be carried out using a voltage 50% greater than the normal rating.

In both AC and DC applications the relay will always assume the energized position in the event of both windings being energized simultaneously.

It is advisable not to put another load in parallel with the windings of the ML relay.

ML Series Relay for DC operation with resistor capacitor network

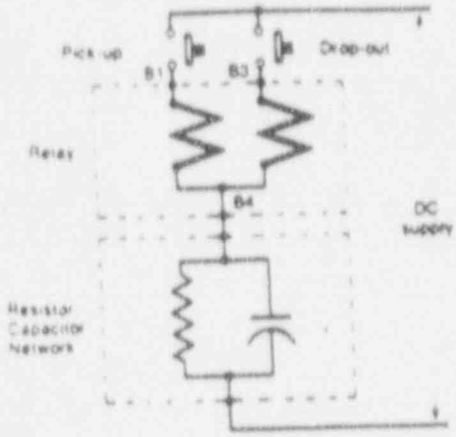


Figure 2

RC-Values

Nominal Voltage DC	R ohms ± 5%	watts	C µf	sec
12	62	2	5000	15
24	240	2	2000	50
48	1000	2	500	100
125	6200	2	150	150

Series TR Time Delay

Features

The Series TR on-delay timer combines the compactness of the AGASTAT Series GP Relay with the traditional accuracy and dependability of AGASTAT Solid State Timing Relays.

Design/Construction

Coupled with this advanced electromechanical design is a field-proven solid-state timing network, an adaptation of the circuit used in the AGASTAT premium grade SSC Timer.

This unique circuit also obviates the need for supplementary temperature-compensation components, affording unusual stability over a realistically broad operating temperature range. It also provides transient protection and protection against premature switching of the output contacts due to power interruption during timing.

SPECIFICATIONS
(Series GP, ML, TR)

Operating Mode
Power/Logic Relay – Series GP
Magnetic Latch – Series ML
Time Delay (Delay on energization) – Series TR

Time Adjustment (Series TR only)
Internal Fixed
Internal Potentiometer

Timing Ranges (Series TR only)

.15 to 3 Sec.	4 to 120 Sec.
.55 to 15 Sec.	10 to 300 Sec.
1 to 30 Sec.	2 to 60 Min.
2 to 60 Sec.	1 to 30 Min.

Accuracy (Series TR only)
Repeat Accuracy: ± 2% at fixed temperature, voltage and off-time.
Overall Accuracy: ± 5% over combined rated extremes of temperature and voltage.

Reset Time (Series TR only)
.075 second

Operate Time (Series GP only)
Operate time at 20°C and rated voltage:

Between energizing and opening of normally closed contacts/less than 18 milliseconds on AC and less than 15 milliseconds on DC.

Between energizing and closing of normally open contacts/less than 35 milliseconds on AC and less than 30 milliseconds on DC.

Between de-energizing and opening of normally open contacts/less than 70 milliseconds on AC and less than 8 milliseconds on DC.

Between de-energizing and closing of normally closed contacts/less than 85 milliseconds on AC and less than 25 milliseconds on DC.

series
GP/ML/TR

control
relays

Operate Time (Series ML only)
Time elapsed between energization and opening of closed contacts.
12 milliseconds max. when latching pulse duration is
AC 80 milliseconds
DC 25 milliseconds
8 milliseconds max. when unlatching pulse duration is
AC 40 milliseconds
DC 20 milliseconds

Transient Protection (Series TR only)
A 1500 volt transient of less than 100 microseconds, or 1000 volts of less than 1 millisecond will not affect timing accuracy.

Contacts
Number of contacts
4 single pole double throw
Nominal rating
10A @ 120 volts AC
(Series GP & TR)
Typical pressure between moving contact and
Normally closed contact:
30 grams
Normally open contact:
100 grams
(Series ML)
Typical pressure between moving contact and
Normally closed contact:
Min. 100 grams
Normally open contact:
Min. 100 grams
(Series GP power relay)
Contact resistance measured at terminals
250 milliohms @ 125V DC,
1 amp
(Series GP logic relay)
Contact resistance measured at terminals
125 milliohms @ 125V DC,
2.5 milliamps

Life
Load life - see chart page 18
Mechanical life - 100 million operations.
(Series GP & TR)
10 million mechanical operations (Series ML)

Coil Operating Voltage

Series GP

	DC					50/60 Hz			
Nominal Coil Voltage	12	24	48	125	250	24	48	120	220
Minimum Pick-up voltage at 40°C	9.5	19	38	100	200	20	41	102	188
Maximum voltage for continuous use	13.5	27	53	143	275	27	53	137	245

For 380 volts AC
Use 6800 ohms 4 watt resistor in series with 220 volts AC relay

For 440 volts AC
Use 8200 ohms 8 watt resistor in series with 220 volts AC relay

Coil drop-out voltages are between 10% and 40% of the rated operating voltages for both DC and AC (For example: in a 120V unit drop-out will occur between 12 and 48 volts.) DC relays will function with unfiltered DC from a full-wave bridge rectifier.

Series ML (± 15%)

Code Letter	Nominal Voltage AC	Pickup DC ohms	Pickup Current (mA)	Drop out DC ohms	Drop out Current (mA)
G	24	15	625	83	250
H	48	86	312	286	125
I	120	370	125	1470	50
J	220	1500	68	5800	28

Code Letter	Nominal Voltage DC	Pickup DC ohms with R-C	Pickup DC ohms without R-C	Pickup Current (mA) with R-C	Pickup Current (mA) without R-C	Drop out DC ohms with R-C	Drop out DC ohms without R-C	Drop out Current (mA) with R-C	Drop out Current (mA) without R-C
A	12	71	9	169	1333	72	10	168	1200
B	24	275	35	87	686	285	44.5	84	540
C	48	1132	132	42	364	1178	178	41	270
D	125	7220	1020	18.2	122	7130	930	17.5	134

Series TR (−15% + 10%)

DC	AC
24 VDC	120V 50-60 Hz
125 VDC	

Power Consumption

SERIES GP
Typical power consumption at rated voltage is:
6VA for AC coils
6 Watts for DC coils
There is no surge current during operation.

SERIES ML
AC: 7.5W for pick-up
3W for drop-out
DC: without R/C network
15W for pick-up
13W for drop-out
DC: with R/C network
2W for pick-up
2W for drop-out

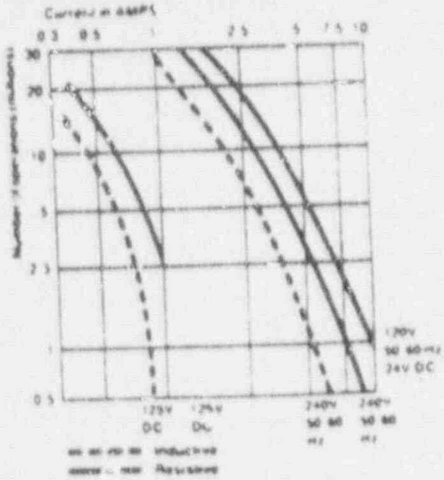
SERIES TR
Typical power consumption at rated voltage is:
6VA for AC coils
6 Watts for DC coils

1371 6-08

series
GP/ML/TR

control relays

Load Life Characteristics



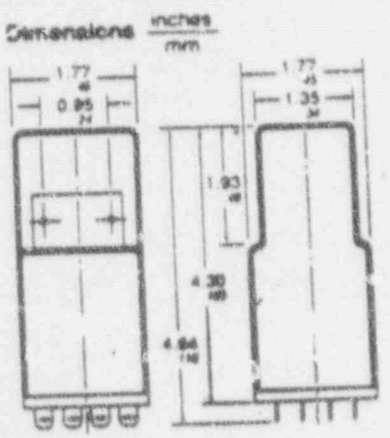
Insulation Resistance
Between all non-connected terminals as well as between non-connected terminals and the relay yoke: 1000 megohms at 500 volts DC.

Dielectric (Series GP & ML)
2000 volts RMS 60 Hz between points specified above.

Dielectric (Series TR)
2000 VAC between terminals and case and between mutually-isolated contacts.

Operating Temperature Range
0°C to 60°C (Series GP & ML)
0°C to 50°C (Series TR)

Dimensions inches/mm



Series GP Power Relay

Voltage	Current (Amps)	Power Factor or Time Constant	Number of Electrical Operations	Remarks
540V AC	3	COS φ = 0.5	10 000	2 contacts in series
380V AC	15	Resistive	10 000	2 contacts in parallel
380V AC	10	Resistive	200 000	
380V AC	3 x 3.3	COS φ = 0.8	200 000	3hp motor
220V AC	20	Resistive	20 000	2 contacts in parallel
220V AC	15	COS φ = 0.5	20 000	2 contacts in parallel
220V AC	10	Resistive	400 000	
220V AC	3 x 6	COS φ = 0.8	200 000	3hp motor
220V AC	5		1 500 000	Filament lamps
220V AC	5	Resistive	3 000 000	
220V AC	2.5	COS φ = 0.25	2 000 000	
220V AC	2	Resistive	15 000 000	
220V AC	1.25	Resistive	30 000 000	
120V DC	1.5	Resistive	20 000 000	with blow-out device
48V DC	10	Resistive	1 000 000	
48V DC	1.5	5 ms	18 000 000	

Series GP logic relay

Voltage	Current (Milliamps)	Number of Electrical Operations
125V DC	2-10	250 000
125V DC	11-50	75 000
48V DC	2-35	250 000
48V DC	36-50	75 000
24V DC	2-60	250 000
12V DC	2-100	250 000
5V DC	2-100	250 000
4V DC	2-100	250 000
2V DC	2-100	250 000

The above ratings are for resistive loads only.

WARNING: Excessive current will destroy gold plating, increase contact resistance and result in contact miss. Contact loads must stay within the above parameters.

Shock (Series GP only)
The relay, when kept energized by means of one of its own contact sets, will withstand 40g shock load when operating on DC, and 150g shock load on AC.

Vibration (Series GP only)
Single axis fragility curve data are available on request at frequencies from 5 Hz to 33 Hz.

Mounting/Terminals
¼" flat base pins.
Screw terminal sockets are available.

Agency Approvals
UL Recognized, CSA Certified (Series GP & ML only)

Weight
Relay complete with cover:
10.9 oz. Net (Series GP & ML)
11 oz. Net (Series TR)

ORDERING INFORMATION
Catalog Number Code/Series GP and ML

GP A N

Model Series
AGASTAT* Series GP – Power or Logic Relay
AGASTAT* Series ML – Magnetic Latch Relay

Coil Voltage
A – 12 VDC
B – 24 VDC
C – 48 VDC
D – 125 VDC
F – 250 VDC*
G – 24 V 60 Hz
H – 48 V 60 Hz
I – 120 V 60 Hz
J – 220 V 60 Hz

Options
A – Logic relay with gold plated stationary and movable contacts. (Use only in combination with sockets which also have gold plated contacts.)
N – Magnetic Blow-out Device
Q – Light to indicate coil energization (with 24VDC, 120VAC, 125VDC, 220VAC, 250VDC voltages only)
R – Internal diode to coil deenergization transient* (When used on DC relay release time increases to the value as the AC equivalent.)

* GP Series Only

See pages 20 and 21 for sockets and other accessories.

Accessories

Plug-in orienting pins (1 Set)

Extracting handle

Magnetic blow out device (for Series GP, ML & TR)

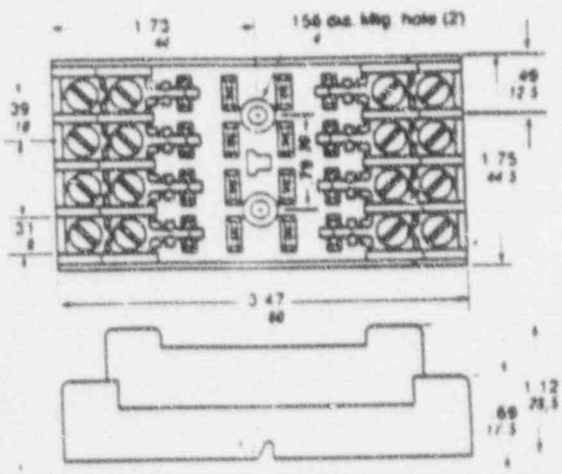
Front connected sockets

With captive clamp terminals
Cat. No. CR0001

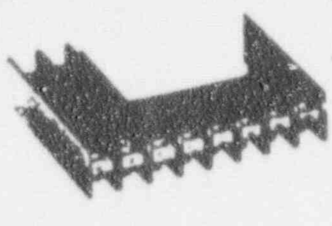
With captive clamp terminals and gold plated contacts
Cat. No. CR0001A

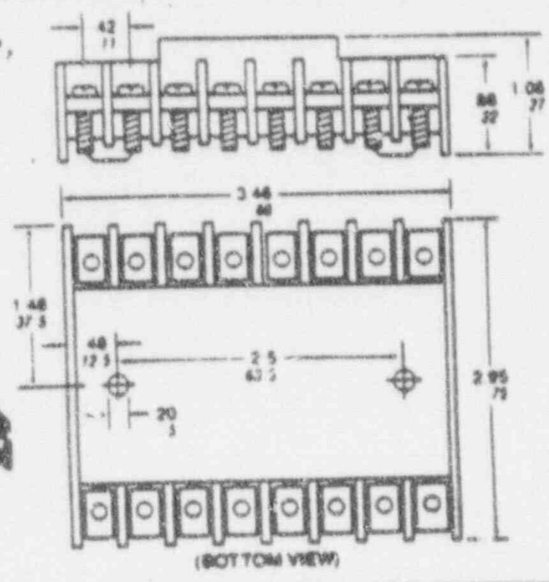
With (#6) binding head screws
Cat. No. CR0002

With (#6) binding head screws and gold plated contacts
Cat. No. CR0002A



With (#6) screw terminals
Cat. No. CR0005





series
GP/ML/TR
control relays

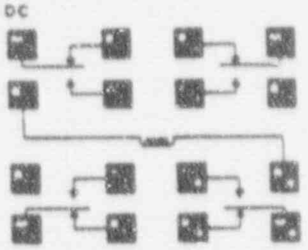
Wiring and Connections

SERIES GP

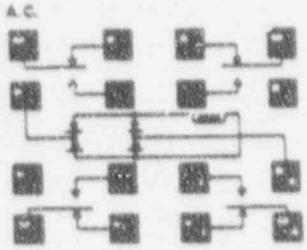
The 16 flat base pins are arranged in four symmetrical rows of four pins; the pitch in both directions being .394". Connection may be made to the relay by soldering. Sockets are available with screw terminals.

The internal wiring of the relay is also symmetrical as shown in the adjacent figure, allowing the relay to be inserted into the socket in either of two positions. Terminals B2 and B3 are provided as extra connections for special applications.

DC



A.C.

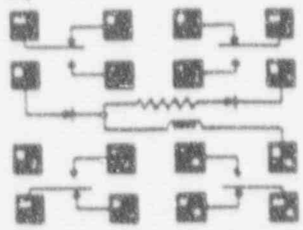


SERIES ML

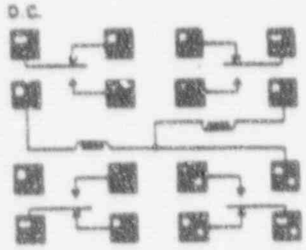
The ML Relay has three terminals for the windings: latching winding between terminals B1 and B4, unlatching winding between terminals B3 and B4. On DC supply terminal B4 is negative. The resistor/capacitor network connects in series with terminal B4.

The ML Relay is not symmetrical due to its three coil connections. When the relay is to be used with plug-in sockets, orienting pins (Cat. N[illegible] 98) should be used.

A.C.

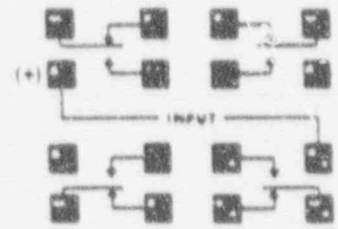


D.C.



SERIES TR

AC and DC



WARRANTY

This product is warranted against mechanical and electrical defects for a period of one year from date of shipment from factory if it has been installed and used in accordance with factory recommendations. Any field repairs or modifications to the original unit will void this warranty. Amerace Corporation's liability is limited to replacement of parts proved defective in workmanship or materials. (W-AB1)

Seismic and Radiation-Tested Models
GP, ML and TR models are available which have been tested to IEEE 323-1974 and IEEE 344-1975. Consult factory for details and special ordering information.

ORDERING INFORMATION

Catalog Number Code/TR series

TR 1 4 B 1 A N

- **TR** — **Model Series**: AGASTAT Series TR - Time Delay Relay
- **1** — **Operation**: 1 - On-Delay
- **4** — **Output**: 4 - 4 PDT
- **B** — **Operating Voltage**: B - 24 VDC; D - 125 VDC; 1 - 120V 50 - 60 Hz
- **1** — **Timing Adjustment**: 1 - Internal Fixed; 3 - Internal Potentiometer
- **A** — **Timing Range**: A - .15 to 3 Sec; B - .55 to 15 Sec; C - 1 to 30 Sec; D - 2 to 60 Sec; E - 4 to 120 Sec; G - 10 to 300 Sec; I - 2 to 60 Min; N - 1 to 30 Min
- **N** — **Options**: N - Magnetic Blow-out Device

See pages 20 and 21 for sockets and other accessories

1373 G-10

RPS CHANNEL INVESTIGATIVE RESPONSE TIME TESTING

This testing accurately evaluated the condition and response time of existing equipment for a sample of four (4) ATTS-related RPS Instrument Channels. The test results indicate that the previous lack of channel response time testing does not represent a significant safety concern, based on the most restrictive RPS response time operability requirements.

The testing was performed on the channels associated with the following sensors:

02-3PT-55A	Rx Vessel Hi Pressure
02-3PT-55B	Rx Vessel Hi Pressure
02-3PT-55C	Rx Vessel Hi Pressure
05PT-14C	Turbine 1st Stage Pressure Scram Bypass

The channels were selected with the criteria that the transmitters and ATTS relays have not been replaced since their original installation during the ATTS modification, and that the channels would be available for testing within the constraints of outage work activities.

The investigative testing measured the total loop response time in segments as follows:

1. *Propagation time of the transient from source to sensor.* This time delay is equal to the travel distance (length of instrument tubing) divided by the speed of sound in the process medium (water). A review of JAF Instrumentation drawings (FK Series) conservatively estimates the longest tubing run to be 130 linear feet. The length will conservatively be assumed to be 150 feet.

2. *Transmitter response time constant.* The transmitter is subjected to a pressure step change via test equipment using a method agreed upon by both General Electric and Rosemount. A hi-speed transducer monitors the pressure step change which is input to the transmitter. The corresponding transmitter output response is also monitored and both signals are captured on a hi-speed recorder. The delay time at 63% of the step change corresponds to the instrument time constant as specified by the manufacturer, Rosemount. The JAF measured time constants of the four transmitters are consistent with actual Rosemount response time testing data for the particular range code of these transmitters.

3. *The signal time delay* from transmitter output to the input of the ATTS Master Trip Unit is considered negligible, since these loops do not contain filter capacitors or any other time delay-causing devices.

4. *ATTS Hardware/Logic Delay Time.* A 4-20 milliamp current step change is applied to the input of the Trip Unit via the ATTS Calibration Device. A four-channel oscilloscope with a trace recorder monitors the input transient and monitors the status of the Trip Unit output and the RPS Primary Relay Output. The resulting trace provides the delay time from ATTS Trip Unit input (transmitter output) through the RPS Primary Relay Output.

5. *ISP-60 RPS Logic Response Time.* ISP-60 data recorded on February 6, 1992 provides the delay time from the input to the RPS Primary Relay through the output of the RPS SCRAM contactors. This test uses an electronic timer across the Primary Relay Input and SCRAM Contactor output; a lead is lifted on the Primary Relay Input (simuating ATTS Relay Drop-out) which initiates the timer and Delay Time is measured until the SCRAM contactor contacts dropout.

The sum of the times associated with each section provides the cumulative RPS Channel Response Time from process source through SCRAM contactor dropout. Additional conservatism is factored into this program by overlapping the Time Delay of the RPS Primary Relay Actuation.

The actual delay times for each of the four tested RPS Channels are tabulated below:

LOOP SECTION	RPS CHANNEL			
	02-3PT-55A	02-3PT-55B	02-3PT-55C	05PT-14C
Propagation Delay*	31	31	31	31
Transmitter Delay	38	38	38	38
ATTS Hardware/ Logic	58	40	48	54
RPS Logic Delay	45.9	41.2	36.8	37.2
TOTAL	173 msec	150 msec	154 msec	160 msec

$$*(150\ ft)\left(\frac{1}{4860\ ft/sec}\right) = 30.8\ msec\ or\ 31\ msec$$

The total instrument channel response times determined by this investigation are significantly less than the required channel response time of 550 msec. These results demonstrate a 200% margin between actual RPS Channel Response Time and the most restrictive RPS Design Basis Response Time.

CHRONOLOGY OF NYPA ACTIONS

On January 14, 1992, the I&C Department performed ISP-101A, "Reactor Protection System (RPS) and Primary Containment Isolation System (PCIS), Analog Trip Master Trip Unit (MTU) Alignment Procedure". The I&C Technicians identified the failure of annunciator 09-5-2-57 to operate as required during the test. The subject annunciator provides the control room operators with an availability status of the MTUs that provide input signals to the Division A Side RPS and PCIS Logic. The I&C Technicians initiated Work Request (WR) 90416 to troubleshoot and correct the deficiency.

On January 17, 1992, while performing ISP 151B, the I&C Technicians identified the "delay" of annunciator 09-5-1-47 (card out of file for 13MTU-207B). The Technicians initiated WR 097547 to investigate and repair.

On January 22, 1992, I&C technicians initiated troubleshooting of the annunciator circuit (WR 90416), in accordance with generic Troubleshooting and Maintenance Procedure ICSO-12. The troubleshooting identified a loose wire and a degradation of the installed AGASTAT ATTS Trip Relay. This relay is normally energized during operation. After removing the relay, visual inspection revealed damaged insulation on the coil wires, discoloration, and degradation of the bobbin.

On January 22, 1992, I&C technicians initiated troubleshooting of annunciator circuit 09-5-1-47 under WR 097547, in accordance with generic Troubleshooting and Maintenance Procedure ICSO-12. Troubleshooting lead the technicians to the conclusion that ATTS Trip Relay 02-3A-K141B was operating intermittently. The relay was replaced with a new relay from stock. Visual inspection indicated that the relay coil bobbin wrap was discolored and that coil lead wire insulation was discolored. The relay case was removed and the coil lead wires were found to be melted where they come into contact with the (metal) relay body. The damaged relay was brought to Systems Engineering for their inspection. The I&C Supervisor and System Engineer decided to proceed with troubleshooting annunciator circuit 09-5-2-57 under WR 90416 to determine if a common failure mode exists.

On January 23, 1992, based on the identified relay degradation, I&C technicians performed drop-out time testing of the removed relay. The results of several tests indicated various cycling times from 658 milliseconds to 10 milliseconds. The inspector received this information verbally from the Systems Engineer due to the fact that the bench testing of the relay was performed informally without a procedure. NYPA conducted a complete disassembly of the relay and noted the following conditions:

- Discolored relay coil wrap
- Discolored and embrittled coil lead insulation
- Plastic coil bobbin cracked and brittle
- Burned insulation and degradation at the point where the relay coil leads contact the metallic relay body

On January 25, 1992, I&C technicians removed relay 23A-K111A and replaced it with a new relay from stock under WR 095869 per JTS Memo 92-0078. This relay is used in the HPCI Steam Line Break Protection Logic and is in a normally de-energized application. The relay was removed to allow disassembly and inspection of an in-service normally de-energized relay. On inspection, no visible signs of degradation were noted.

On January 25, 1992, NYPA established a corrective action plan to resolve the degraded AGASTAT Relay issue. The plan included:

- Establish an approved procedure for removal of degraded relays that affect protective channels needed for defueling and cold shut-down conditions.

- Use of relays installed in unused (spare) ATTS channels as replacements for degraded relays that affect protective channels needed for fuel offload.

  Affected relay case surface temperatures were also to be measured and recorded.

On January 25, 1992, NYPA determined that drop-out time testing of the installed (spare) relays was required, as the relays were installed in the cabinet(s) for 7 years. It was thought that potential dust accumulation on the relay internals may have adversely affected drop-out time.

On January 25, 1992, NYPA conducted a Plant Operating Review Committee (PORC) meeting to discuss the immediate safety concerns and corrective actions associated with the AGASTAT Relays. PORC opened an item to review the RPS design basis prior to core alterations. PORC approved the procedure for relay replacement. PORC then directed the Operations Department to initiate a 10 CFR 50.72 report regarding the damaged relays.

On January 25, 1992, NYPA issued an Operating Event Report, No. OE 5063, through INPO to the Industry, identifying the slow relay response time. NYPA investigation determined that the relay degradation was due to heat and aging, and resulted in a slower relay response time. NYPA concluded the degradation was isolated to normally energized relays, since normally de-energized relays did not exhibit any evidence of degradation. NYPA completed an evaluation of all the ATTS channels affected (i.e., which included normally energized AGASTAT GP Series relays) and determined what channels were required by Technical Specifications (TS) for the existing plant conditions. With the plant in refuel mode, and all control rods fully inserted; and, the reactor and refuel cavity flooded with the spent fuel pool gates removed, NYPA concluded that the logic channels containing the degraded relays were not required to be operable. NYPA established necessary administrative controls to prevent plant condition changes (i.e. refuel activities or work that could potentially drain the vessel) that would require operability of safety-related protective systems potentially affected by the degraded AGASTAT GP Series relays.

On January 25, 1992, I&C technicians removed 24 installed spare ATTS relays. This work was performed under Work Request (WR) 097471. The I&C Technicians completed drop-out time tests on the 24 relays. These relays had been previously modified (Mod. No. F1-86-055) with a transient suppression diode that increased the drop-out time. The test data ranged from 15 milliseconds to 38 milliseconds. The degraded relays were replaced with the tested spare relays under Work Requests 096919 and 096918. The maintenance instructions for the relay swaps were provided in ISP-100A through D, "RPS and PCIS Instrument Functional Test and Calibration".

On January 26, 1992, the ATTS Design Vendor (General Electric) was contracted to determine the design basis response time requirements of the ATTS system. This data was then used to determine the acceptability of the increase in ATTS trip relay drop-out time due to the transient suppression diode.

On January 27, 1992, NYPA decided to prepare a 10 CFR 50.59 Nuclear Safety Evaluation (JAF-SE-92-30) to document the acceptability of a 42 millisecond increase in AGASTAT relay drop-out time for the RPS ATTS control relays.

On the evening of January 27, 1992, the Shift Supervisor declared the A and C EDGs inoperable because the AGASTAT GP Series relays installed in the Fuel Oil Transfer Pump Logic had exceeded their qualified life. The Technical Services Staff determined that a failure of the relays could result in failure of the fuel oil transfer pump to automatically start when required (i.e. low day tank level). NYPA Engineering review determined that manual start of the fuel oil transfer pumps was still available at the EDG control panels and that the existing low day tank level alarm setpoint provided sufficient fuel to support one hour of EDG operation prior to transfer pump operation.

On January 28, 1992, the PORC reviewed 10 CFR 50.59 Safety Evaluation JAF-SE-92-030. The purpose of the safety evaluation was to determine the acceptability of a 42 millisecond increase in AGASTAT relay drop-out time for the RPS ATTS control relays. The cause of the increase response time was the modification which installed the transient suppression diode.

The safety evaluation concluded that the increase in response time was within the allowable channel response time, and was accepted by the PORC, pending concurrence form the vendor. The inspector, who attended the PORC meeting, questioned the PORC chairman regarding what additional items were necessary to declare the required safety systems operable to support refueling. The chairman stated completion of EDG A and C relay replacements was the only outstanding item left to support refueling. The inspector informed the chairman that the NRC was still reviewing the situation. After further review by the NRC staff, the inspector conveyed to plant management that additional design basis, licensing basis, RPS Technical Specification (TS) operability and surveillance testing questions still existed with respect to TS 3.1.a., RPS response time testing. NYPA management agreed to delay refueling operations until a discussion between the NRC staff and NYPA could be held to resolve these concerns.

Later on January 28, 1992, a conference call was conducted between NRC staff and NYPA management. After further review, NYPA concluded the concerns were valid and immediately suspended preparation for refueling. NYPA committed to review the design basis for RPS, PCIS, and ECCS protection systems, correct T.S. 3.1.a, and establish an adequate surveillance test to assure the operability of the RPS system, prior to initiating refueling activities.

TIME LINE

Events (chronological listing)

1975	EDG Fuel Oil Transfer Pump Control Circuit Modification (F1-74-019); installed GP-Series Control Relays
1982	ATTS Modification (F1-82-053) initiated
1983	NRC Generic Letter 83-28
	Initial interim response to NRCG 83-28 indicating current situation and planned changes
	INPO SER 68-82 Supplement 1
	GE issued qualification report used for ATTS
1984	NRC I&E Bulletin 84-02
	NRCB 84-02 evaluated by JAF strictly for HFA relays and no others
	NRC Information Notice 84-20
	NRCN 84-20 evaluated by JAF as NOT APPLICABLE because "neither of these relays is installed in safety-related systems." [inaccurate assessment]
	"Final" response to NRCG 83-28
1985	ATTS Modification (F1-82-053) installed but not closed
	SER 68-82, Supplement 1, reviewed by JAF as not requiring corrective action as the GP-Series Relays installed in the ATTS were not of the affected batch (i.e., not pre-August 1977)
1986	Transient Suppression Diode Modification (F1-86-055) made to ATTS trip relays
1988	Modification M1-88-145 initiated by Maintenance Department to replace Agastat Time Delay Relays in EDG switchgear (past their "service life")
1989	OER 890345 (Amerace Letter) - Identified GP-Series Relays in ATTS as nearing end of life
1990	Modification D1-90-034 was initiated to replace Agastat Type GP-Series Relays in EDG fuel oil transfer system
1991	OER 890345 evaluation identifies GP-Series Relays in ATTS as needing replacement (WR written to evaluate need for replacement)
1992	Amerace GP-Series Relay fails during Surveillance Test

MODIFICATION FOR INSTALLATION OF ATTS NOISE SUPPRESSION DIODE

In 1987, Modification F1-86-055, ATTS Cabinets External/Internal Wiring Changes, installed the Noise Suppression Diode Assemblies across the coils of selected ATTS relays. This was done in accordance with General Electric's Field Disposition Instruction (FDI) No. RKHJ. (attached)

This modification includes the following attached Safety Evaluations (JAF-SE-86-129, JAF-SE-86-135, JAF-SE-86-147, and JAF-SE-86-174), which document the diode addition to the selected ATTS relays.

GENERAL ELECTRIC

FIELD DISPOSITION INSTRUCTION

FDI NO. RKHJ

REVISION 9

SHEET 1 OF 19

DATE OF ISSUE ISSUED BY PD & RC NOV 19 1986

PROJECT FITZPATRICK UNIT N/A

EQUIPMENT ANALOG TRIP SYSTEM

ECN/IR/DDR/FDDR WA EPF700581

MPL NO. PROD. SUMMARY SECT. 7

DESCRIPTION OF TASK

1.0 PURPOSE

1.1 This FDI revision supplements previous revisions of this FDI and and revises section 4.1.6 of this FDI revision 8. Changes to revision 8 are denoted by | .

1.2 Identify and provide information necessary to re-work ATS Panels 9-91,92,93,94,95,96 to accomplish the following:

a. add noise suppression diode assemblies across the coil of selected relays.
b. re-terminate the shield for all process sensor wiring at the associated trip unit interface terminal board.
c. replace the twisted shielded pair sensor wiring with shielded three conductor wiring inside the ATS Panels for all RTD and steam line flow measurement loops.
d. add new terminal boards to Panels 9-95 96 to accommodate the paragraph 1.2c wiring.
e. provide analog output signals from selected master trip units to be used as inputs to the NYPA supplied EPIC System.
f. add new terminal boards to the ATS Panels to accommodate the paragraph 1.2e wiring.
g. add contact output trip signals to be used as inputs to the NYPA supplied ATWS/ARI Logic System.
h. replace the existing 2-3-51A,B,C,D pressure switch loops with new ATS loops.

1.3 Transmit the documentation which authorizes the paragraph 1.2 changes. The ATS documents listed in paragraph 2.1 of this FDI supersede all previous revisions of these documents.

APPROVALS	DATE	APPROVALS	DATE
E.J.SCHMIDT (signature)	11/17/86		
FDI ORIGINATOR: N.POMPILIO PER TELECON 11/17/86 (signature)	11/17/86		
QUALITY: N/R			
MATL APPL ENGR: R.P.ORNELLAS (signature)	11/17/86		
ENGRG MANAGER: E.J.SCHMIDT (signature)	11/17/86		
RESPONSIBLE ENGR: J.SILVA PER E.ELECANY 11/17/86 (signature)	11/17/86		
PROJECT MANAGER			

THIS EQUIPMENT IS SAFETY RELATED [X] YES [ ]
SAFETY FUNCTION IS AFFECTED [ ] YES [X]

FIELD WORK ORDER NO.

COMPLETION REC REQUIRED BY R. E: YES [ ] NO [X]

DISTRIBUTION CODE: INTERNAL | EXTERNAL

FDI TASK COMPLETED | DATE

SITE QUALITY CONTROL

FIELD MANAGER

NEW YORK POWER AUTHORITY
JAMES A. FITZPATRICK NUCLEAR POWER PLANT

NUCLEAR SAFETY EVALUATION
NO. JAF-SE-86-129

TITLE: ATTS CABINETS EXTERNAL/INTERNAL WIRING CHANGES   QA CLASS I,II,1E

X Plant Modification F1-86-055-IP-1

___ Minor Modification

___ TEST NO.______

___ EXPERIMENT

___ OTHER (Describe)________________

A. The proposed change, test or experiment:

1. ( ) Does (✓) Does Not - Increase the probability of occurrence or consequences of an accident or malfunction of equipment important to safety previously evaluated in the FSAR.

2. ( ) Does (✓) Does Not - Create the possibility of an accident or malfunction of a type other than evaluated previously in the FSAR.

3. ( ) Does (✓) Does Not - Reduce the margin of safety as defined in the basis for Technical Specifications.

4. ( ) Does (✓) Does Not - Involve a change in the Technical Specifications nuclear or environmental. Para. Sec. N/A -

5. ( ) Does (✓) Does Not - Involve an unreviewed safety question (1, 2, 3 and/or 4).

Prepared by: [signature]
Title: Control Systems Engineer

Review by: M. Sarmiento
(normally Tech. Serv.)
Title: Project Engineer

PORC. MTC. NO. & DATE 55 9-22-86
SRC MTC. NO. & DATE 03-87 3.3.87

NUCLEAR SAFETY EVALUATION

ANALOG TRANSMITTER TRIP SYSTEM (ATTS) CABINET EXTERNAL/INTERNAL WIRING CHANGES

A. NUCLEAR SAFETY EVAL. NO: JAF-SE-86-129
MODIFICATION NO: F1-86-055-IP-1
QA CATEGORY I, II, Class 1E Safety-Related

B. SCOPE OF MODIFICATION

The scope of this modification is to change external/internal wiring in ATTS Cabinets 09-92 and 09-94 during a plant shutdown, when safety systems are not required, to accomplish the following:

1. Re-terminate the RTD's sensor wiring at the terminal board to provide an independent shield path to minimize noise problems (shielded three conductor wiring).

2. Terminate EPIC computer wiring at the ATTS cabinet terminal blocks to permit future external connection for analog outputs into the EPIC Computer.

3. Re-terminate the steam flow sensor wiring to accommodate filter capacitors.

4. Re-terminate all process sensor shields at the associated trip unit interface terminal board.

5. Change internal cabinet wiring to support the replacement of existing 2-3PS-51A, B, C and D pressure switches with new ATTS loop per FDI-RKHJ Rev. 6.

6. Add noise suppression diode assemblies across the coil of selected relays.

C. REASON FOR THIS MODIFICATION

The reason for this modification is to provide the proper internal and external wiring changes to the ATTS cabinets as directed by General Electric FDI No. RKHJ Rev. 6, to accomplish changes described in item B (above).

D. ENGINEERING SAFETY EVALUATION

The following design basis were reviewed for the impact of this modification on plant safety.

- ATTS Instrument Loops
- Separation
- Seismic

- Routing

1. ATTS Instrument Loops

   The ATTS instrument loops characteristics affected by this modification have previously been analyzed by General Electric in Licensing Topical Report NEDO-21617-A Class I Decemer 1978. Recommended wiring changes are as per GE-FDI-RKHJ References 2.1.1 through 2.1.7.

2. Separation

   Cables entering the cabinets are not changed by this modification. The existing cabinets will possess the same degree of separation that existed prior to this modification. Since the function of the existing cabinets are outside the scope of this modification no further evaluation has been considered.

3. Seismic

   Retermination of existing cables and addition of a few external connection outputs to the EPIC computer does not significantly change the seismic characteristics of the existing cabinets. (Ref. GE letter IS-86-0811-1 by J. Silva to G. Stranovsky dated August 21, 1986)

4. Routing

   No cable routing takes place in this modification.

   The evaluation of the design discussed in this section indicates that the overall performance of the plant has not been degraded. The modification enhances existing conditions.

E. SUMMARY

It is determined from this review that this modification will have no effect on the following:

1. The probability of occurrence or consequences of an accident evaluated in the FSAR or other safety analysis reports have not been increased.
2. The probability of an accident or malfunction of a different type than any previously evaluated has not been created.
3. The margin of safety as defined in the bases of any Technical Specification has not been reduced.
4. Implementation of this modification does not constitute an unreviewed safety question pursuant to 10CFR50.59.

F. REFERENCES

1. IEEE-279-1971 - Criteria for Protection Systems for Nuclear Power Generating Stations.

2. IEEE 323-1974 - Qualifying Class 1E Equipment for Nuclear Power Generating Stations.

3. IEEE 344-1975 - Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Equipment.

4. Reg. Guide 1.75 - Physical Independence of Electrical Systems.

5. Reg. Guide 1.89 - (IEEE 323-1974) - Qualification of Class 1E Equipment for Nuclear Power Plants.

6. G.E. Spec. No. 22A1421, Revision 1 - Electrical Separation.

7. G.E. Spec. No. 22A3052, Revision 3 - Electrical Separation.

8. FSAR Section 7.17, 7.1.9, 7.1.15, and 7.1.16 - Instrumentation and Control Design Criteria.

9. FSAR Section 8.5.4.2, 8.5.6, and 8.9 - Electrical Design Criteria.

10. FSAR Section 12.4.6.1, 12.4.6.2, 12.4.8, 12.4.9, and Table 12.4.2, 12.4.6.

11. Separation Criteria for Safeguard Electrical Circuits for JAFNPP revised June 15, 1973.

12. Attachment 3 IE Bulletin 79-01B, Rev. 4 James A. Fitzpatrick Nuclear Power Plant High Energy Line Break Analysis.

13. Reassessment of the JAFNPP for Conformance to the Requirements of Appendix R to 10CFR50, Docket No. 50-333 July 13, 1982.

14. NEDO-21617-A Class I, Dec. 1978, Licensing Topical Report - Analog Transmitter/Trip Unit System for Engineered Safeguard Sensor Trip Units.

15. Analog Trip System Elementary Diagram - General Electric - 865E365.

16. Analog Trip System Interconnecting Diagram - General Electric - 913E702.

17. James A Fitzpatrick Nuclear Power Plant Technical Specification.

18. GAI Purchase Specification - SP-733-001 Local Racks, Rev. 0, dated (Later).

19. Nuclear Safety Evaluation JAF-SE-84-027 prepared for Mod F1-82-53.

20. GE letter JS-86-0821-1 from John Silva to G. Stranovsky dated August 21, 1986.

NEW YORK POWER AUTHORITY
JAMES A. FITZPATRICK NUCLEAR POWER PLANT

PREOPERATIONAL TEST NUCLEAR SAFETY EVALUATION
NO. JAF-SE-86-135

TITLE: ATTS CABINETS EXTERNAL/INTERNAL WIRING CHANGES   QA CLASS I,II,1E

___ Plant Modification F1-86-055

___ Minor Modification

_X_ TEST NO. 02-3B

___ EXPERIMENT

___ OTHER (Describe)________________

A. The proposed change, test or experiment:

1. ( ) Does / (X) Does Not - Increase the probability of occurrence or consequences of an accident or malfunction of equipment important to safety previously evaluated in the FSAR.

2. ( ) Does / (X) Does Not - Create the possibility of an accident or malfunction of a type other than evaluated previously in the FSAR.

3. ( ) Does / (X) Does Not - Reduce the margin of safety as defined in the basis for Technical Specifications.

4. ( ) Does / (X) Does Not - Involve a change in the Technical Specifications nuclear or environmental. Para. Sec. N/A

5. ( ) Does / (X) Does Not - involve an unreviewed safety question (1, 2, 3 and/or 4).

Prepared by: Russel Hottenstein
Title: Control Systems Engineer

Review by: [signature]
(normally Tech. Serv.)
Title: P.E.

PORC. MTG. NO. & DATE 86-061 Oct. 4, 1986
SRC MTG. NO. & DATE [illegible]

PRE-OP TEST NUCLEAR SAFETY EVALUATION
ATTS CABINETS EXTERNAL/INTERNAL WIRING CHANGES

NUCLEAR SAFETY EVAL. NO:	JAF-SE-86-135
TEST NO:	POT-02-3B
MODIFICATION NO:	F1-86-055-IP-1
QA CATEGORY:	I, II, Class 1E Safety-Related
SYSTEM NO:	02, 05, 23, 33

A. SCOPE

The scope of this test is to ensure that each Analog Transmitter/Trip System (ATTS) instrument loop affected by Modification No. F1-86-055-IP-1 operates to accurately monitor the parameter being sensed, to supply a "trip" output to RPS logic at the desired setpoint, and to indicate certain conditions which result in inoperable status.

This procedure verifies for ATTS Cabinets 09-92 & 09-94 the following:

1. Gross failure alarm function for ATTS instrument loops.

2. Trip unit out of file alarm function for ATTS master trip units and slave trip units.

3. Power failure alarm function for ATTS trip unit cabinets.

4. Calibrated range and "as-found" setpoints for ATTS instrument loops.

5. Ability to check trip and reset functions of ATTS instrument loops using calibration units installed in ATTS trip unit cabinets.

6. The completion of surveillance procedures which prove accuracy, linearity and hysteresis of ATTS instrument loops are within acceptable tolerances.

7. The completion of surveillance procedures which verify desired trip setpoints at ATTS instrument loop master trip units and slave trip units.

B. TEST CONDITIONS

1. This pre-operational test shall be accomplished after Modification No. F1-86-055-IP-1 has been completed and before the plant is returned to service.

2. The ATTS cabinets (9-92 and 9-94) are energized but the systems which will respond to the new instrumentaiton in these cabinets

still remain tagged out or otherwise still remain unresponsive to ATTS instrumentation prior to satisfactory completion of this test.

3. Control Room annunciator panels must be operational.

C. REASON

The reason for this pre-operational test is to verify the operability of the RPS system loops affected by Modification No. F1-86-055-IP-1.

D. IMPACT OF THE CHANGES

1. Modification No. F1-86-055-IP-1 at the Fitzpatrick Nuclear Power Plant will have a positive impact on plant safety. This modification is based on anticipated improvements in plant availability.

2. Diodes are being installed across the relay coils due to the possibility of induced noise when the coil is energized. Their is a possibility that this noise could create an undesirable trip. The diodes will dampen this induced EMF.

3. Steam Flow Loops, are inherently noisy, and the installation of capacitors will provide a smoother output.

4. 2-3-251A thru D pressure switches cause setpoint drifts. They will be replaced by ATTS Loops that presently monitor the same process parameters.

E. IMPLEMENTATION OF THE CHANGES

The changes proposed will not impact the fire protection program at Fitzpatrick, nor will the changes impact the environment. The implementation will however enhance the reliability of the ATTS System.

F. CONCLUSION

It is determined from this review that the installation of this modification as described above will result in the following:

1. The probability of occurrence or consequences of an accident evaluated in the FSAR or other safety analysis reports have not been increased.

2. The probability of an accident or malfunction of a different type than any previously evaluated has not been created.

3. The margin of safety as defined in the bases of any Technical Specification has not been reduced.

4. Implementation of this modification does not constitute an unreviewed safety question pursuant to 10CFR50.59.

G. REFERENCES

1. IEEE-279-1971 - Criteria for Protection Systems for Nuclear Power Generating Stations.

2. IEEE-323-1974 - Qualifying Class 1E Equipment for Nuclear Power Generating Stations.

3. IEEE-344-1975 - Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Equipment.

4. Reg. Guide 1.75 - Physical Independence of Electrical Systems.

5. Reg. Guide 1.89 - (IEEE-323-1974) - Qualification of Class 1E Equipment for Nuclear Power Plants.

6. G.E. Spec. No. 22A1421, Rev. 1 - Electrical Separation.

7. G.E. Spec. No. 22A3052, Rev. 3 - Electrical Separation.

8. FSAR Sections 7.1.7, 7.1.9, 7.1.15 and 7.1.16 - Instrumentation and Control Design Criteria.

9. FSAR Sections 8.5.4.2, 8.5.6 and 8.9 - Electrical Design Criteria.

10. FSAR Sections 12.4.6.1, 12.4.6.2, 12.4.8 and 12.4.9 and Tables 12.4.2 and 12.4.6.

11. Separation Criteria for Safeguard Electrical Circuits for JAFNPP revised June 15, 1973.

12. Attachment 3 IE Bulletin 79-02B, Rev. 4 James A. Fitzpatrick Nuclear Power Plant High Energy Line Break Analysis.

13. Reassessment of the JAFNPP for Conformance to the Requirements of Appendix R to 10CFR50, Docket No. 50-333, July 13, 1982.

14. NEDO-21617-A Class I, December 1978, Licensing Topical Report - Analog Transmitter/Trip Unit System for Engineered Safeguard Sensor Trip Units.

15. Analog Trip System Elementary Diagram - General Electric - 865E365, Rev. 13.

16. Analog Trip System Interconnecting Diagram - General Electric - 913-E712, Rev. 6.

17. James A Fitzpatrick Nuclear Power Plant Technical Specification.

18. IEEE-384-1981 - Standard Criteria for Independence of Class 1E Equipment and Circuits.

19. GE letter JS-86-0821-1 from John Silva to G. Stranovsky dated August 21, 1986.

20. Preoperational Test Safety Evaluation No. JAF-SE-85-052.

NEW YORK POWER AUTHORITY
JAMES A. FITZPATRICK NUCLEAR POWER PLANT

PREOPERATIONAL TEST NUCLEAR SAFETY EVALUATION
NO. JAF-SE-86-147

TITLE: ATTS CABINETS EXTERNAL/INTERNAL WIRING CHANGES QA CLASS I,II,1E

___ Plant Modification F1-86-055

___ Minor Modification

X TEST NO. 02-3C

___ EXPERIMENT

___ OTHER (Describe)________________

A. The proposed change, test or experiment:

1. ( ) Does / (X) Does Not - Increase the probability of occurrence or consequences of an accident or malfunction of equipment important to safety previously evaluated in the FSAR.

2. ( ) Does / (X) Does Not - Create the possibility of an accident or malfunction of a type other than evaluated previously in the FSAR.

3. ( ) Does / (X) Does Not - Reduce the margin of safety as defined in the basis for Technical Specifications.

4. ( ) Does / (X) Does Not - Involve a change in the Technical Specifications nuclear or environmental. Para. Sec. N/A

5. ( ) Does / (X) Does Not - Involve an unreviewed safety question (1, 2, 3 and/or 4).

Prepared by: [signature]
Title: I & C PE

Review by: [signature]
(normally Tech. Serv.)
Title: Plant Engineer

PORC. MTG. NO. & DATE 87-005 1/22/87
SRC MTG. NO. & DATE 7-87 7-8-87

PRE-OP TEST NUCLEAR SAFETY EVALUATION
ATTS CABINETS EXTERNAL/INTERNAL WIRING CHANGES

NUCLEAR SAFETY EVAL. NO:	JAF-SE-86-147
TEST NO:	POT-02-3C
MODIFICATION NO:	F1-86-055-IP-2
QA CATEGORY:	I, II, Class 1E Safety-Related
SYSTEM NO:	02-3, 05, 23, 33

A. SCOPE

The scope of this test is to ensure that each Analog Transmitter/Trip System (ATTS) instrument loop affected by Modification No. F1-86-055-IP-2 operates to accurately monitor the parameter being sensed, to supply a "trip" output to RPS logic at the desired setpoint, and to indicate certain conditions which result in inoperable status.

This procedure verifies for ATTS Cabinets 09-91 & 09-93, 09-95 & 09-96 the following:

1. Gross failure alarm function for ATTS instrument loops.

2. T ip unit out of file alarm function for ATTS master trip units and slave trip units.

3. Power failure alarm function for ATTS tri unit cabinets.

4. Calibrated range and "as-found" setpoints for ATTS instrument loops.

5. The completion of surveillance procedures which prove accuracy, linearity and hysteresis of ATTS instrument loops are within acceptable tolerances.

6. The completion of surveillance procedures which verify desired trip setpoints at ATTS instrument loop master trip units and slave trip units.

B. TEST CONDITIONS

1. This pre-operational test shall be accomplished after Modification No. F1-86-055-IP-2 has been completed and before the plant is returned to service.

2. The test shall be performed with the plant shutdown in the cold condition. The trip and initiation circuits (RPS or ECCS) to be tested are not required to be operable by the plant condition in effect at the time of testing.

3. The ATTS cabinets (09-91, 09-92, 09-95 & 09-96) are energized but the systems which will respond to the new instrumentaiton in these cabinets still remain tagged out or otherwise still remain unresponsive to ATTS instrumentation prior to satisfactory completion of this test.

4. Control Room annunciator panels must be operational.

C. <u>REASON</u>

The reason for this pre-operational test is to verify the operability of the RPS system loops affected by Modification No. F1-86-055-IP-2.

D. <u>IMPACT OF THE TEST</u>

There is no impact of this test on plant safety if prerequisites presented in PRE-OP 02-3C are followed.

E. <u>IMPLEMENTATION OF THE CHANGES</u>

The changes proposed will not impact the fire protection program at Fitzpatrick, nor will the changes impact the environment. The implementation will however enhance the reliability of the ATTS System.

F. <u>CONCLUSION</u>

It is determined from this review that the installation of this modification as described above will result in the following:

1. The probability of occurrence or consequences of an accident evaluated in the FSAR or other safety analysis reports have <u>not</u> been increased.

2. The probability of an accident or malfunction of a different type than any previously evaluated has <u>not</u> been created.

3. The margin of safety as defined in the bases of any Technical Specification has <u>not</u> been reduced.

4. The performance of this test does <u>not</u> constitute an unreviewed safety question pursuant to 10CFR50.59.

G. <u>REFERENCES</u>

1. IEEE-279-1971 - Criteria for Protection Systems for Nuclear Power Generating Stations.

2. IEEE-323-1974 - Qualifying Class 1E Equipment for Nuclear Power Generating Stations.

3. IEEE-344-1975 - Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Equipment.

4. Reg. Guide 1.75 - Physical Independence of Electrical Systems.

5. Reg. Guide 1.89 - (IEEE-323-1974) - Qualification of Class 1E Equipment for Nuclear Power Plants.

6. G.E. Spec. No. 22A1421, Rev. 1 - Electrical Separation.

7. G.E. Spec. No. 22A3052, Rev. 3 - Electrical Separation.

8. FSAR Sections 7.1.7, 7.1.9, 7.1.15 and 7.1.16 - Instrumentation and Control Design Criteria.

9. FSAR Sections 8.5.4.2, 8.5.6 and 8.9 - Electrical Design Criteria.

10. FSAR Sections 12.4.6.1, 12.4.6.2, 12.4.8 and 12.4.9 and Tables 12.4.2 and 12.4.6.

11. Separation Criteria for Safeguard Electrical Circuits for JAFNPP revised June 15, 1973.

12. Attachment 3 IE Bulletin 79-02B, Rev. 4 James A. Fitzpatrick Nuclear Power Plant High Energy Line Break Analysis.

13. Reassessment of the JAFNPP for Conformance to the Requirements of Appendix R to 10CFR50, Docket No. 50-333, July 13, 1982.

14. NEDO-21617-A Class I, December 1978, Licensing Topical Report - Analog Transmitter/Trip Unit System for Engineered Safeguard Sensor Trip Units.

15. Analog Trip System Elementary Diagram - General Electric - 865E365, Rev. 13.

16. Analog Trip System Interconnecting Diagram - General Electric - 913-E712, Rev. 6.

17. James A Fitzpatrick Nuclear Power Plant Technical Specification.

18. IEEE-384-1981 - Standard Criteria for Independence of Class 1E Equipment and Circuits.

19. GE letter JS-86-0821-1 from John Silva to G. Stranovsky dated August 21, 1986.

20. Preoperational Test Safety Evaluation No. JAF-SE-85-052.

21. GE-FDI-RKHJ, Rev. 9.

NEW YORK POWER AUTHORITY
JAMES A. FITZPATRICK NUCLEAR POWER PLANT

NUCLEAR SAFETY EVALUATION
NO. JAF-SE-86-174

TITLE: ATTS CABINETS EXTERNAL/INTERNAL WIRING CHANGES QA CLASS I,II,1E

X Plant Modification F1-86-055-IP-2

___ Minor Modification

___ TEST NO.____

___ EXPERIMENT

___ OTHER (Describe)________________

____

A. The proposed change, test or experiment:

1. ( ) Does (✓) Does Not - Increase the probability of occurrence or consequences of an accident or malfunction of equipment important to safety previously evaluated in the FSAR.

2. ( ) Does (✓) Does Not - Create the possibility of an accident or malfunction of a type other than evaluated previously in the FSAR.

3. ( ) Does (✓) Does Not - Reduce the margin of safety as defined in the basis for Technical Specifications.

4. (✓) Does ( ) Does Not - Involve a change in the Technical Specifications nuclear or environmental. Para. Sec. Tables 4.1-1, -2

5. ( ) Does (✓) Does Not - Involve an unreviewed safety question (1, 2, 3 and/or 4).

Prepared by: [signature] 11/20/86
Title: Control Systems P.E.

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Title: Plant Engineer

PORC. MTG. NO. & DATE 86-078 12/3/86
SRC MTG. NO. & DATE 04-87 4-7-87

NUCLEAR SAFETY EVALUATION
(PHASE 1A)
ANALOG TRANSMITTER TRIP SYSTEM (ATTS) CABINET
EXTERNAL/INTERNAL WIRING CHANGES

A. **NUCLEAR SAFETY EVAL. NO:** JAF-SE-86-174
MODIFICATION NO; F1-86-055-IP-2
QA CATEGORY I, II, Class 1E Safety-Related

B. **SCOPE CF MODIFICATION**

The scope of this modification is to change external/internal wiring in ATTS Cabinets 09-91, 09-93. 09-95 and 09-96 during a plant shutdown, when safety systems are noc required, to accomplish the following:

1. Re-terminate the RTD's sensor wiring at the terminal board to provide an independent shield path to minimize noise problems (shielded three conductor wiring).

2. Terminate EPIC computer wiring at the ATTS cabinet terminal blocks to permit future external connection for analog outputs into the EPIC Computer.

3. Re-terminate the steam flow sensor wiring to accommodate filter capacitors.

4. Re-terminate all process sensor shields at the associated trip unit interface terminal board.

5. Change internal cabinet wiring to support the replacement of existing 2-3PS-51A, B, C and D pressure switches with new ATTS loop per FDI-RKHJ Rev. 9.

6. Add noise suppression diode assemblies across the coil of selected relays.

7. Terminate points for the AWTS modification.

C. **REASON FOR THIS MODIFICATION**

The reason for this modification is to provide the proper internal and external wiring changes to the ATTS cabinets as directed by General Electric FDI No. RKHJ Rev. 9, to accomplish changes described in item B (above).

D. **ENGINEERING SAFETY EVALUATION**

The following design basis were reviewed for the impact of this modification on plant safety.

- ATTS Instrument Loops
- Separation

- Seismic
- Routing

1. <u>ATTS Instrument Loops</u>

   The ATTS instrument loops characteristics affected by this modification have previously been analyzed by General Electric in Licensing Topical Report NEDO-21617-A Class I Decemer 1978. Recommended wiring changes are as per GE-FDI-RKHJ References 2.1.1 through 2.1.7.

2. <u>Separation</u>

   Cables entering the cabinets are not changed by this modification. The existing cabinets will possess the same degree of separation that existed prior to this modification. Since the function of the existing cabinets are outside the scope of this modification no further evaluation has been considered.

3. <u>Seismic</u>

   Retermination of existing cables and addition of a few external connection outputs to the EPIC computer does not significantly change the seismic characteristics of the existing cabinets. (Ref. GE letter IS-86-0821-1 by J. Silva to G. Stranovsky dated August 21, 1986)

4. <u>Routing</u>

   No cable routing takes place in this modification.

   The evaluation of the design discussed in this section indicates that the overall performance of the plant has not been degraded. The modification enhances existing conditions.

E. SUMMARY

It is determined from this review that this modification will have no effect on the following:

1. The probability of occurrence or consequences of an accident evaluated in the FSAR or other safety analysis reports have <u>not</u> been increased.

2. The probability of an accident or malfunction of a different type than any previously evaluated has <u>not</u> been created.

3. The margin of safety as defined in the bases of any Technical Specification has <u>not</u> been reduced.

4. Implementation of this modification does <u>not</u> constitute an unreviewed safety question pursuant to 10CFR50.59.

F. **REFERENCES**

1. IEEE-279-1971 - Criteria for Protection Systems for Nuclear Power Generating Stations.

2. IEEE 323-1974 - Qualifying Class 1E Equipment for Nuclear Power Generating Stations.

3. IEEE 344-1975 - Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Equipment.

4. Reg. Guide 1.75 - Physical Independence of Electrical Systems.

5. Reg. Guide 1.89 - (IEEE 323-1974) - Qualification of Class 1E Equipment for Nuclear Power Plants.

6. G.E. Spec. No. 22A1421, Revision 1 - Electrical Separation.

7. G.E. Spec. No. 22A3052, Revision 3 - Electrical Separation.

8. FSAR Section 7.17, 7.1.9, 7.1.15, and 7.1.16 - Instrumentation and Control Design Criteria.

9. FSAR Section 8.5.4.2. 8.5.6, and 8.9 - Electrical Design Criteria.

10. FSAR Section 12.4.6.1, 12.4.6.2, 12.4.8, 12.4.9, and Table 12.4.2, 12.4.6.

11. Separ[illegible]on Criteria for Safeguard Electrical Circuits for JAFNPP revis[illegible] June 15, 1973.

12. Attach[illegible]t 3 IE Bulletin 79-01B, Rev. 4 James A. Fitzpatrick Nuclear Power Plant High Energy Line Break Analysis.

13. Reassessment of the JAFNPP for Conformance to the Requirements of Appendix R to 10CFR50, Docket No. 50-333 July 13, 1982.

14. NEDO-21617-A Class I, Dec. 1978, Licensing Topical Report - Analog Transmitter/Trip Unit System for Engineered Safeguard Sensor Trip Units.

15. Analog Trip System Elementary Diagram - General Electric - 865E365.

16. Analog Trip System Interconnecting Diagram - General Electric - 913E702.

17. James A Fitzpatrick Nuclear Power Plant Technical Specification.

18. CAI Purchase Specification - SP-733-001 Local Racks, Rev. 0, dated (Later).

19. Nuclear Safety Evaluation JAF-SE-84-027 prepared for Mod F1-82-53.

20. GE letter JS-86-0821-1 from John Silva to C. Stranovsky dated August 21, 1986.