PDR-016

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JUN 25 1984

Ms. Nina Bell
Nuclear Safety Analyst
Nuclear Information & Resource Service
1346 Connecticut Avenue, NW
Washington, DC 20036

IN RESPONSE REFER
TO FOIA-84-316

Dear Ms. Bell:

This is in further response to your April 24, 1984, letter requesting documents regarding failures in electrical relays.

Appendix A is a list of 23 additional documents relating to your letter. These documents are being placed in the PDR in file folder 84-316.

The staff is continuing its search for additional documents. You will be notified as the search progresses.

Sincerely,

J. M. Felton, Director
Division of Rules and Records
Office of Administration

Enclosure: Appendix A

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PDR FOIA
BELL84-316 PDR

ENCLOSURE 1

1. Draft IE/IN No. 83 undated - 2 pages
2. Handwritten notes undated - 1 page
3. Memo on proposed IE Information Notice, draft, undated, R. J. Mattson to D. G. Eisenhut - 9 pages
4. Draft IE IN #83, undated - 3 pages
5. Letter from L. F. Dale (MPL) to H. R. Denton, NRC, dated January 20, 1984 - 2 pages
6. Letter from L. F. Dale to H. R. Denton, dated January 6, 1984 - 18 pages
7. Letter from L. F. Dale to H. R. Denton, dated January 12, 1984 - 2 pages
8. Draft Confirmation of Action letter to MPL dated November 18, 1983 - 6 pages
9. Letter from L. F. Dale to J. P. O'Reilly (NRC), dated November 10, 1983 - 3 pages.
10. Memo from R. W. Houston (NRC) to T. M. Novak (NRC), dated October 28, 1983 - 7 pages
11. Letter form N. W. Curtis (PP&L) to R. C. Haynes (NRC), dated March 2, 1983, w/transmittal page - 4 pages
12. Letter from J. P. McGaughy, Jr. (MPL) to J. P. O'Reilly, dated October 17, 1983, - 5 pages
13. Letter from A. Schwencer (NRC) to J. P. McGaughy, Jr., dated October 13, 1983 - 4 pages
14. Notice of Significant Licensee Meeting, dated September 21, 1983 - 1 page
15. Letter from R. C. Lewis (NRC) to J. E. Richard (MPL), dated October 3, 1983 - 3 pages
16. Memo from R. C. Lewis to E. L. Jordan, R. W. Starostecki, C. E. Norelius, J. E. Gagliardo, T. W. Bishop (NRC), dated September 23, 1983 - 6 pages
17. Letter from MPL to J. P. O'Reilly, dated September 22, 1983 - 5 pages
18. Letter from MPL to J. P. O'Reilly, dated September 6, 1983 - 5 pages
19. Letter from L. F. Dale to J. P. O'Reilly, dated August 31, 1983 - 5 pages

20. Letter from A. R. Smith (GE) to J. F. Pinto (MPL), dated September 15, 1983 - 1 page

21. Letter from J. E. Nichols (GE) to J. F. Pinto, dated September 3, 1983 - 2 pages

22. Letter from MPL to J. P. O'Reilly, dated August 20, 1983 - 7 pages

23. IE Information Notice 82-48, dated December 3, 1982, with Distribution List - 5 pages

NIRS

Nuclear Information and Resource Service

1346 Connecticut Avenue NW, 4th Floor, Washington D C 20036 (202) 296 7552

April 25, 1984

FREEDOM OF INFORMATION ACT REQUEST
FOIA-84-316
Rec'd 4-26 84

Director
Office of Adminstration
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

FREEDOM OF INFORMATION ACT REQUEST

To whom it may concern:

Pursuant to the Freedom of Information Act, 5 U.S.C. 522, as amended, the Nuclear Information and Resource Service requests the following documents regarding recent reports of failures in electrical relays. Please consider "documents" to include reports, studies, test results, correspondence, memoranda, meeting notes, meeting minutes, working papers, graphs, charts, diagrams, notes and summaries of conversations and interviews, computer records, and any other forms of written communication, including internal NRC Staff memoranda. The documents are specifically requested from, but not limited to, Office of the Executive Legal Director (OELD); Office of Analysis and Evaluation of Operational Data (AEOD); Office of Nuclear Regulatory Research (Research); Office of Nuclear Reactor Regulation (NRR); Generic Issues Branch of the Division of Safety Technology, NRR; and the Operating Reactors Branches of the Division of Licensing. In your response, please identify which documents correspond to which requests below.

Pursuant to this request, please provide all documents prepared or utilized by, in the possession of, or routed through the NRC related to:

1. The 1983 Class 1E relay failures at the Duane Arnold, Pilgrim, and Hatch plants;

2. The utilization (extent and age of installed components) of GE Type HFA 51, Series AC relays or others using Lexan as coil spool material (See IE Bulletin 84-02, dated 3/12/84);

3. Consideration by the Staff on how to address the earlier-than-anticipated end-of-life-failure of relays and their associated components, including replacement options, schedules etc., particularly internal staff memoranda;

~~8411290219~~

4. Failure sequences possible due to failure of the relays identified in IE Bulletin 84-02;

5. Any NRC responses or analyses to GE's SILs and SALs referenced in IE Bulletin 84-02, issued since 1973;

6. Documentation by utilities or other bases for staff justification to allow operation of plants utilizing:
   -- Agastat GP Series Relays;
   -- GTE Sylvania AC Relays;
   -- GE HFA Relays; and

7. The relay failures at the Grand Gulf and Three Mile Island-1 plants in 1983.

In our opinion, it is appropriate in this case for you to waive copying and search charges, pursuant to 5 U.S.C. 552(a)(4)(A) "because furnishing the information can be considered as primarily benefiting the general public." The Nuclear Information and Resource Service is a non-profit organization serving local organizations concerned about nuclear power and providing information to the general public.

Sincerely,

Nina Bell
Nuclear Safety Analyst

cc: File

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

OCT 28 1983

MEMORANDUM FOR: Thomas M. Novak, Assistant Director for Licensing
Division of Licensing

FROM: R. Wayne Houston, Assistant Director for Reactor Safety
Division of Systems Integration

SUBJECT: CHAPTER 7 INSTRUMENTATION AND CONTROL
GRAND GULF NUCLEAR STATION

Plant Name: Grand Gulf, Units 1 and 2
Docket Nos.: 50-416/417
Licensing Status: OL
Project Manager: Dean Houston
Review Branch: ICSB
Review Status: Incomplete

Enclosed we are providing the Instrumentation and Control Systems Branch (ICSB) input to Supplement No. 5 of the Safety Evaluation Report related to the operation of Grand Gulf Nuclear Station.

As a result of our review we have resolved concerns related to the technical specifications that specify the reactor protection system instrument operability requirements and surveillance requirements. This completes the ICSB portion of TACS 52370 and 52524. The enclosed SER input includes one confirmatory item related to instrument setpoint methodology. We anticipate that this item will be resolved in the first quarter of 1984. The enclosed SER input includes one open item related to the Agastat type relays in the reactor protection system. By letter dated October 13, 1983, from A. Schwencer (NRC) to J. McGaughy (MP&L) we requested additional information from the licensee concerning the Agastat type relays. Resolution of this open item is pending receipt of additional information from the licensee.

Any questions concerning this SSER input should be directed to M. Virgilio of the ICSB.

R. Wayne Houston, Assistant Director
for Reactor Safety
Division of Systems Integration

Enclosure:
As noted

cc: R. Mattson
D. Houston
R. Capra
D. Hoffman

8311140249 XA

OCT 26 1983

7.0 Instrumentation and Control

7.8 Response to Inspection and Enforcement Bulletins and Other Safety Concerns

J. Reactor Protection System Instrumentation Technical Specifications

From a comparison of the instrumentation operability requirements contained in the Grand Gulf - Unit 1 Technical Specifications to the instrumentation specification tables included in the FSAR the NRC staff found that in some cases the Technical Specifications include only one-half the total number of channels provided. By letter dated September 12, 1983, from A. Schwencer (NRC) to J. McGaughy (MP&L) the NRC staff requested the licensee to confirm that the single failure criterion can be satisfied for each case where the minimum number of operable channel requirements of the technical specifications is less than the total number of channels provided for each reactor protection system trip function.

By letters dated October 11, 1983, from J. McGaughy (MP&L) to H. Denton (NRC) and October 14, 1983, from L. F. Dale (MP&L) to H. Denton the licensee provided the results of their review of this item. The licensee reviewed the Grand Gulf - Unit 1 Technical Specification requirements for the reactor trip, isolation actuation, emergency core cooling actuation and reactor core isolation cooling (RCIC) actuation instrumentation. From the

results of this review the licensee found that in most cases the FSAR incorrectly states the number of instrument channels provided and proposed to submit corrections in the annual FSAR update scheduled for June 1984. For the RCIC actuation instrumentation the licensee proposed a Technical Specification change to increase the number of instrument channels required to be operable from two to four, thus enhancing RCIC reliability and plant safety.

Based on the results of its review the licensee has confirmed that the single failure criterion is satisfied for the reactor trip, isolation actuation, emergency core cooling actuation, and RCIC actuation instrumentation when the Technical Specification requirements are met. With the additional information provided and incorporation of the proposed Technical Specification changes the NRC staff considers this issue resolved.

Certain Grand Gulf - Unit [illegible]chnical Specification action statements permi[illegible]ued plant operation with less than the minimum channels operable requirement satisfied provided the inoperable instrument channels are placed in the tripped condition. From discussions with the licensee's representatives the NRC staff found that in some cases placing a channel in the tripped condition includes lifting leads and the use of temporary jumpers.

By letter dated September 12, 1983, from A. Schwencer to J. McGaughy the NRC staff requested the licensee to confirm that the licensing criteria (e.g., physical separation, qualification) are not compromised where leads are lifted or jumpers are installed.

By letter dated October 14, 1983, from L. F. Dale to H. Denton the licensee stated that they do not normally use lifted leads or temporary jumpers to place safety-related systems' actuation instrumentation channels in the tripped condition. However, if jumpers or lifted leads are utilized, the modification is considered a temporary alteration and will be accomplished using administrative procedures such as an engineering work order. To resolve the NRC staff concern the licensee has proposed to revise the facilities administrative procedures to ensure that seismic, environmental and separation criteria are considered when making such temporary alterations under an engineering work order. Plant procedures will be revised as necessary by November 30, 1983, to accomplish this commitment. Based on the licensee's commitment the NRC staff considers this issue resolved.

The Grand Gulf - Unit 1 Technical Specification surveillance requirements include provisions for frequently

calibrating certain reactor protection system instrumentation channel components. The Rosemount trip units in the reactor trip and emergency core cooling system actuation instrumentation systems are required to be calibrated monthly. From a review of the Grand Gulf - Unit 1 Technical Specifications and discussions with the licensee's representatives the NRC staff found that the Rosemount trip units and the temperature switches associated with the isolation actuation instrumentation system were only required to be calibrated at 18 month intervals. By letter dated September 12, 1983, from A. Schwencer to J. McGaughy the NRC staff requested that the licensee confirm that the method and frequency for calibrating and functionally testing the reactor protection system instrumentation is consistant with the assumption of the instrument channel setpoint methodology.

By letter dated October 14, 1983, from L. F. Dale to H. Denton the licensee stated that presently all of the Rosemount trip units in the isolation actuation system are being calibrated monthly and temperature switches in the isolation actuation instrumentation system are being calibrated annually. The licensee stated that changes would be proposed to revise the Grand Gulf - Unit 1 Technical Specifications to require a monthly calibration of the Rosemount trip units and a yearly calibration of

the temperature switches, consistent with the manufacturer's recommendations and current practice at Grand Gulf. The NRC staff finds this acceptable. Addressing the overall issue of setpoint methodology the licensee stated that they are participating with the other BWR owners and General Electric Company to develop a setpoint methodology position statement.

The NRC staff will confirm the acceptability of the setpoint methodology and confirm that the surveillance currently required supports the assumptions of the licensee's methodology position statement.

k. Agastat Relay Failures

During recent surveillance testing at Grand Gulf twelve inoperable Agastat type relays were found. These relay failures precluded the automatic operation of three standby service water system valves, one low pressure coolant injection system valve, and components in the control room HVAC system, combustible gas control system, reactor core isolation cooling system, containment spray system, and the fire protection system.

By letter dated October 13, 1983, from A. Schwencer (NRC) to J. McGaughy (MP&L) the NRC staff requested additional information about the testing of Agastat type relays.

By letter dated October 17, 1983, from J. McGaughy to J. O'Reilly (NRC) the licensee submitted a report under the guidelines of 10 CFR Part 21 noting that deficiencies in the Agastat type relays could potentially create a substantial safety hazard. In its report the licensee stated that the normally energized Agastat type relays have an estimated service life of 4.5 years. The licensee expects to replace these relays in the Spring of 1984. To verify the adequacy of the surveillance program at Grand Gulf to detect failures of these relays we will require the licensee to provide the additional information requested in our October 13, 1983 letter.

DRAFT

SSINS No 6835
IN 83 ___

IE Information Notice No 83-__
Service Life of AGASTAT G.P. RELAYS

Addressees:
All nuclear Power reactor facilities holding an operating license (OL) or Construction permit (CP)

Purpose:
This information notice is provided as notification of a potentially significant problem pertaining to the tested Service life of Agastat GP relays used in the normally energized mode.

Description of Circumstances:

The failures at GGNS involve Agastat GP series relays manufactured prior to August 1977 to change state when called upon to operate. The failure of the relays to operate properly has been determined to be due to the nylon movable contact arm coming in contact with the barrier strip on the melamine phenol relay base. This resulted in mechanical interference and inability of the relay contacts to make proper contact. MP&L has determined that these failures are applicable to Agastat GP series relays manufactured prior to August 1977. Agastat GP series relays manufactured at a later date were of a different design that prevented moveable arm and barrier strip interference.

MP&L sent several malfunctioning GP Series Agastat relays to General Electric for evaluation and determination of the cause of failure.

Initial indication of the failure mode of the relays indicated the possibility of post-mold shrinkage. Failure mode testing and reliability analysis was cooperatively performed by MP&L, Amerace Corporation, and General Electric, to determine the root cause of the GGNS failures. It has been determined by G. E. and Amerace through extensive testing that the failures were due to service aging of normally energized relays in a mild environment in combination with the mechanical configuration and tolerances of the internal parts specific to pre-August 1977 relays.

The calculated service life, based on test data, for Agastat GP Series relays in a continuous operating mode (normally energized) is 4.5 years. The calculated service life for normally non-energized relays is greater than 40 years.

DRAFT

It appears that the calculated service life for the energized state is far below the unenergized state.

~~The vendor has~~

The relay manufacturer has designed a new relay EGP for nuclear service. ~~The~~ new relay is ~~rated~~ for 10 year service ~~life~~ life which ~~includes~~ includes ~~shelf~~ shelf life and 25000 operations.

If you have any question regarding this matter, please contact the Regional Administrator of the appropriate NRC Regional Office or this office

E. L JORDEN

TECHNICAL CONTACT: T. D. GIBBONS
(404-221-5552

Agritet

919-288-1500 - Hile Assoc Inc.
Greensboro, N.C. Jack Hile

Factory Cont. DON ALEXANDER 201-964-4400
Union N.J.
Customer Service Manager
Control Products Division of
Amerace

James Cooper Nat. Sales Mgr

on 9/23/83

Memo Thru Herdt to file

Numerous calls from Utilities
on same subject

Mtg with MP&L

MEMORANDUM FOR: Darrell G. Eisenhut, Director
Division of Licensing

FROM: Roger J. Mattson, Director
Division of Systems Integration

DRAFT

SUBJECT: PROPOSED IE INFORMATION NOTICE - UNDERESTIMATED SERVICE LIFE OF AGASTAT GP SERIES RELAYS

In July and August 1983 during the performance of periodic surveillance tests at Grand Gulf Nuclear Station 12 inoperable Agastat GP series relays were identified. These relay failures precluded the automatic operation of three standby service water system valves, one low pressure coolant injection valve, and components in the control room ventilation system, combustible gas control system, reactor core isolation cooling system, residual heat removal system, containment drywell instrumentation, high pressure core spray system and fire protection system.

By letter dated October 17, 1983 from J. P. McGaughy of Mississippi Power and Light Company (the licensee for Grand Gulf) to J. P. O'Reilly, Regional Administrator NRC Region II, the licensee provided the results of an evaluation of the Agastat GP series relay failures under the reporting guidelines of 10 CFR Part 21. From its evaluation the licensee determined that the relay failures were end-of-service-life failures that could have created a substantial safety hazard. We agree with these findings.

The relay failures at Grand Gulf were determined to be end-of-service-life failures only after extensive testing by the manufacturer. Although no qualified service life had previously been specified for the Agastat GP series relays it is apparent that such a short service life had not been anticipated.

Contact:
M. Virgilio, ICSB
X29454

Each nuclear facility should have a systematic preventative maintenance and component replacement program. We believe that this information regarding Agastat relay service life should be input to that program where applicable to preclude possible common cause failures. Accordingly, we have prepared the enclosed IE Information Notice.

Failures of Agastat GP series relays at Limerick, Susquehanna and Waterford are currently being evaluated to obtain additional information with regard to this concern. To date the results of this evaluation support our findings on the failures identified at Grand Gulf. Although our review effort is ongoing, we believe that at this point in time it would be prudent to disseminate the information we have collected.

Roger J. Mattson, Director
Division of Systems Integration
Office of Nuclear Reactor Regulation

Enclosure:
As stated

cc: H. Denton
E. Case
E. Rossi

Dist: AD/RS, F. Rosa, J. Calvo, T. Dunning

DRAFT

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

IE INFORMATION NOTICE NO. 83- . UNDERESTIMATED SERVICE LIFE OF AGASTAT GP SERIES RELAYS

ADDRESSEES:

All holders of a nuclear power reactor operating license (OL) or construction permit (CP).

PURPOSE:

This information notice is provided as a notification of a potentially significant problem pertaining to Agastat GP series relays. It is expected that recipients will review the information for applicability to their facilities and to take appropriate actions. No specific action or response is required at this time.

DESCRIPTION OF CIRCUMSTANCES:

Agastat GP series relays manufactured by Amerace Corporation are used in the reactor protection system and other safety-related systems actuation instrumentation and control circuits. Earlier than anticipated end-of-service-life failures of Agastat GP series relays were reported by Mississippi Power and Light Company on October 17, 1983 under the provisions of 10 CFR Part 21 for the Grand Gulf Nuclear Station. It has been determined that the relay failures could have created a substantial safety hazard.

During the performance of 18 month surveillance tests at Grand Gulf 12 inoperable Agastat GP series relays were identified. These relay failures precluded the automatic operation of three standby service water system valves, one low pressure injection valve and components in the control room ventilation system, combustible gas control system, reactor core isolation cooling system, residual heat removal system, containment drywell instrumentation high pressure core spray system and fire protection system.

On September 2, 1983 Mississippi Power and Light Company, General Electric and Amerace Corporation began a combined effort to determine the failure mechanism. Through examination and testing the failures of the relays to operate properly were determined to be a result of the nylon movable contact arm coming in contact with the barrier strip on the melamine phenol plastic relay base. This mechanical interference consequently prevented the relay from changing state.

Through additional testing it has been determined that the failures were end-of-service-life failures due to service aging of energized relays in a mild environment in combination with the mechanical configuration and tolerances of the internal parts. The calculated service life, based on test data, for the Agastat GP series relays operated in the energized state is now 4.5 years. The calculated service life for Agastat GP series relays operated in the de-energized state is 40 years.

Agastat GP series relays manufactured between 1975 and 1977 exhibited casing shrinkage following assembly as the melamine phenol plastic base cured. This phenomenon was called post-mold plastic shrinkage. The post-mold plastic shrinkage caused a reduction in clearances and in some assemblies mechanical interference between the moving relay contact arm and the stationary base of the relay case. It was determined that mechanical interference resulting from post-mold shrinkage would either result in relay failure within the first year after assembly as the curing process completed or would not occur at all. Consequently, in August 1977, Amerace Corporation introduced a design change modifying the relay base by cutting a notch in the barrier strip to provide additional clearances which would preclude mechanical interference resulting from post-mold plastic shrinkage. Subsequent operational experience has shown that this design change precludes failures related to post-mold shrinkage, however, there is no evidence that the notched base design extends the service life of the energized relays.

We advise all nuclear power plants to review their safety-related systems to ascertain whether Agastat GP series relays have been installed or are being held as spare parts. Preventative maintenance programs should recognize the application dependent (energized/de-energized) service life of these Agastat GP series relays.

If you have any questions regarding these matters please contact the Administrator of the appropriate Regional Office or this office.

E. L. Jordan, Director
Division of Engineering & Quality Assurance
Office of Inspection and Enforcement

(1) No Indication of the Failure mode - NOT FAIL SAFE

(2) Our Questions on Service life of Notched relays

~~(3) No~~

3 Info Notice not should be circular or Bull

93 DEC 6 P12 : 21

NRC FORM 366 (11-91) NRCM 5370

U.S. NUCLEAR REGULATORY COMMISSION

FACSIMILE TRANSMITTAL REQUEST

REQUESTER'S MAILING ADDRESS

STREET

CITY | STATE

DATE

RETURN ORIGINAL TO SENDER ☐ YES ☐ NO

MESSAGE TO

NAME AND ORGANIZATION: C. Julian - Region II

FACSIMILE PHONE NUMBER

VERIFICATION PHONE NUMB

CITY | STATE

AUTOMATIC ☐ YES ☐ NO

NUMBER OF PAGES (INCLUDI TRANSMITTAL INSTRUCTIONS): 7

MESSAGE FROM

NAME: M Virgilio | TELEPHONE NO.: X29454

BUILDING: Phillips - P-1020F | MAIL STOP

FACSIMILE PHONE NUMBER

HIGH-SPEED (UP TO 2 MIN.) AUTOMATIC ☐ YES ☐ NO

LOW-SPEED (3+ MIN.) AUTOMATIC ☐ YES ☐ NO

VERIFICATION TELEPHONE NUMBER

PRECEDENCE

☐ OVERNIGHT ☐ FOUR HOURS ☐ TWO HOURS ☐ ONE HOUR ☒ IMMEDIATE

SPECIAL INSTRUCTIONS

None

TIME/DATE (Stamp)

RECEIVED	TRANSMITTED
12	

12/06/93 18:28 NRC-PHILLIPS NO. 008 008

ROUTING AND TRANSMITTAL SLIP Date 12/6/83

TO: (Name, office symbol, room number, building, Agency/Post)		Initials	Date
1. F. Rosa	P. Farron		
2. E. Rossi	D. Verrelli (RII) DMV		
3. C. Julian (R. II)	W. Foster (RIV)		
4. M. Chiramal			
5. J.T. Beard			

Action	File	Note and Return
Approval	For Clearance	Per Conversation
As Requested	For Correction	Prepare Reply
Circulate	For Your Information	See Me
Comment	Investigate	Signature
Coordination	Justify	

REMARKS

Following reported malfunctions of Agastat GP series relays at Grand Gulf several industry representatives and NRC staff members recommended NRC action. The attached IE Information Notice is one possible action. I would appreciate your comments.

DO NOT use this form as a RECORD of approvals, concurrences, disposals, clearances, and similar actions

FROM: (Name, org. symbol, Agency/Post)	Room No.—Bldg.
Marty Virgilio	P-1030F
	Phone No. X29454

5041-102

OPTIONAL FORM 41 (Rev. 7-76)
Prescribed by GSA
FPMR 41 CFR 101-11.206

* GPO : 1981 O - 341-529 (121)

12/06/83 10:29 NRC-PHILLIPS NO.008 010

DRAFT

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

Comments to NRR by C. Julian Region II on the draft IE info notice

IE INFORMATION NOTICE NO. 83- . UNDERESTIMATED SERVICE LIFE OF AGASTAT GP SERIES RELAYS

ADDRESSEES:

All holders of a nuclear power reactor operating license (OL) or construction permit (CP).

PURPOSE:

This information notice is provided as a notification of a potentially significant problem pertaining to Agastat GP series relays. It is expected that recipients will review the information for applicability to their facilities and to take appropriate actions. No specific action or response is required at this time.

DESCRIPTION OF CIRCUMSTANCES:

Agastat GP series relays manufactured by Amerace Corporation are used in the reactor protection system and other safety-related systems actuation instrumentation and control circuits. Earlier than anticipated end-of-service-life failures of Agastat GP series relays were reported by Mississippi Power and Light Company on October 17, 1983 under the provisions of 10 CFR Part 21 for the Grand Gulf Nuclear Station. It has been determined that the relay failures could have created a substantial safety hazard.

During the performance of 18 month surveillance tests at Grand Gulf 12 inoperable Agastat GP series relays were identified. These relay failures precluded the automatic operation of three standby service water system valves, one low pressure injection valve and components in the control room ventilation system, combustible gas control system, reactor core isolation cooling system, residual heat removal system, containment drywell instrumentation, high pressure core spray system and fire protection system.

On September 2, 1983 Mississippi Power and Light Company, General Electric and Amerace Corporation began a combined effort to determine the failure mechanism. Through examination and testing the failures of the relays to operate properly were stated determined to be a result of the nylon movable contact arm coming in contact with the barrier strip on the melamine phenol plastic relay base. This mechanical interference consequently prevented one of the four sets of contacts in the relay from changing state.

After the licensee has stated Through additional testing ~~it has been~~ determined that the failures were end-of-service-life failures due to service aging of energized relays in a mild environment in combination with the mechanical configuration and close tolerances of the internal parts. The calculated service life, based on test data, for the Agastat GP series relays operated in the energized state is now stated to be 4.5 years. The calculated service life for Agastat GP series relays operated in the de-energized state is 40 years. NRC has not reviewed the details of this testing, nor independently confirmed the results.

Agastat GP series relays manufactured between 1975 and 1977 exhibited casing shrinkage following assembly as the melamine phenol plastic base cured. This phenomenon was called post-mold plastic shrinkage. The post-mold plastic shrinkage caused a reduction in clearances and in some assemblies mechanical interference between the moving relay contact arm and the stationary base of the relay case. It was determined that mechanical interference resulting from post-mold shrinkage would either result in relay failure within the first year after assembly as the curing process completed or would not occur at all. Consequently, in August 1977, Amerace Corporation introduced a design change modifying the relay base by cutting a notch in the barrier strip to provide additional clearances which would preclude mechanical interference resulting from post-mold plastic shrinkage. Subsequent operational experience has shown that this design change precludes failures related to post-mold shrinkage, however, there is no evidence that the notched base design extends the service life of the energized relays. The failures at Grand Gulf are not considered to be post mold shrinkage.

We advise all nuclear power plants to review their safety-related systems to ascertain whether Agastat GP series relays have been installed or are being held as spare parts. Preventative maintenance programs should recognize the application dependent (energized/de-energized) service life of these Agastat GP series relays.

If. An improved version of this relay, the EGP series is now available. The EGP series has been environmentally qualified and exhibited a service life of 10 years.

DRAFT

11/18

Mississippi Power and Light Company

ATTN: Mr. D. C. Lutkin, President

P. O. Box 1640

Jackson, MS 39205

Gentlemen:

SUBJECT: CONFIRMATION OF ACTION - GRAND GULF 1, DOCKET NO. 50-416

This refers to a meeting held on November 18, 1983 with Mr. J. B. Richard, Senior Vice President, concerning matters related to work to be completed at Grand Gulf. With regard to the matters discussed, it is our understanding that Mississippi Power and Light Company (MP&L) will take the following actions:

1. We have reviewed and concur in the actions you committed to accomplish in your letter AECM-83/0727 of November 10, 1983. We understand that you have removed from all licensed duties the individuals holding license numbers,

Senior Reactor Operator SOP-20108, Senior Reactor Operator SOP-4216, Reactor Operator OP-6239 and Reactor Operator OP-6241, effective November 4, 1983. MP&L will provide supplementary training of these individuals in those areas where weaknesses in their training are identified.

2. Conduct a review of the previous training of all licensed Senior Reactor Operators, and Reactor Operators, Shift Technical Advisors and on-shift Operations Advisors for existing weaknesses. Verify for weaknesses supplemental training has been provided to those individuals. If during this review individuals are identified with cumulative significant weaknesses in knowledge, MP&L will promptly assess the need to remove the individual from licensed duties for accelerated training.

3. Prior to exceeding 5% power, MP&L will complete the recertification program for the operating staff as described in MP&L's letter AECM-83/___ dated November 17, 1983.

4. Discuss the results of your review and supplemental training provided, prior to returning those identified in 1 above, to licensed duties.

5. Power to exceeding 5% power, the Plant Safety Review Committee (PSRC) will conduct a thorough review of all Incident Reports, Reportable Occurrences, Potentially Reportable Deficiencies (Part 21), Construction Deficiency Reports, Quality Assurance and Plant Quality documents, Temporary Alteration Records and any other identified plant discrepancy reports to assure that any safety related deficiencies in hardware or procedures are corrected. MP&L will provide a copy of the report of this review as approved by the PSRC to this office prior to exceeding 5% power.

6. Prior to exceeding 5% power, MP&L will replace all safety related Brown Boveri, Inc., (formally ITE) circuit breaker trip units of the suspected deficient series with serial numbers below 283300 as described in MP&L's letter, AECM-83/06666, of October 10, 1983.

7. Prior to exceeding 5% power, MP&L will replace and test, as appropriate, all normally energized safety related Agastat GP relays of the suspected deficient series as described in MP&L's letter AECM-83/0668 of October 17, 1983. The remaining safety related relays will be replaced as required with relays which are of a different design. MP&L will have replaced all suspect safety related Agastat relays prior to restart after the first refueling.

8. Prior to exceeding 5% power, MP&L will complete the 7 day functional test on the Division II diesel generator and place in effect programs which will implement those ~~responsibilities~~ reliability enhancements described in Section 6.0 of the GGNS Diesel Generator Reliability Report submitted to the NRC in MP&L's letter AECM-83/0689 dated October 26, 1983.

9. Prior to July 1, 1984, MP&L will conduct a review of plant procedures and correct all instances of improper use, as described in NRC Inspection Report 50-416/83-43, of the words "should" or "must" as defined in the MP&L Topical-1A Quality Assurance Program.

Please inform this office immediately if your understanding is different from that stated above.

Sincerely

James P. O'Reilly

Regional Administrator

COA 416/83-01

cc: F. W. Lewis, President

Middle South Services, Inc.

C. K. McCoy, Plant Manager

bcc: NRC Resident Inspector

Document Control Desk

State of Mississippi

D. Houston, LPM, NRR

C. Julian, RII

L. Watson, RII

RII	RII	RII	RII
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EGP
31

o: Tom Conlon

n: Gary Rhoads

83 SEP 23 A7:39

g: 1 of 4

Tom:

Susquehanna sent GP Relays found in D16 panels to AMERACE for Repair & then Replaced other GP's with the EGP's.

Any questions please call.