

October 26, 1993

NOTE FOR : All DEIIB Personnel (on STP DET)
FROM : Sada Pullani
SUBJECT : REVIEW OF STP RESPONSE TO DET REPORT

This note is being issued as directed by Stu. Please find attached the STP Business Plan (BP), which is the second part of its response to the DET report (Operational Readiness Plan (ORP), the first part, was previously distributed for your comments on September 10, 1993). If your time permits, please review the ORP and the BP, and forward your comments to me for incorporating into a memo from Ed Jordan to Region IV .

According to Henry, things to consider are licensee's understanding of the issues, as well as the depth, breadth, and timing of proposed corrective actions. Mr Jordan has not been too interested, in the past, with having the licensee get into the details of each and every corrective action, but has been more interested in the overall approach to the major problems.

Please return your comments to me along with the bottom part of this note by COB on November 5, 1993.

Enclosure: As stated

cc:

S. Rubin

H. Bailey

File D912

SVP File 1.39

E-File:H:\D912933.SVP

Please check one item below and return to Sada Pullani:

- 1. I have no comments
- 2. I have the following comments (attach additional sheets, if necessary):

D/so



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20585-0001

November 2, 1993

MEMORANDUM FOR: James M. Taylor
Executive Director for Operations

FROM: Thomas E. Murley, Director
Office of Nuclear Reactor Regulation

SUBJECT: NRR STAFF ACTIONS RESULTING FROM THE DIAGNOSTIC EVALUATION
AT SOUTH TEXAS PROJECT

In a memorandum dated August 3, 1993, you assigned responsibilities for resolution of certain generic and plant-specific actions resulting from the diagnostic evaluation team's assessment at the South Texas Project (Enclosure 1). The staff actions involved various administrative and technical issues that were under the cognizance of NRR, Region IV, AEOD, or some combination thereof.

The purpose of this memorandum is to provide a status of those items assigned to NRR, which constitutes the 90-day report requested in the aforementioned memorandum. Region IV will provide a separate response to those items under its review. The status of each of the NRR items is briefly summarized below and memoranda from the involved technical branches are enclosed for your information.

Action 1.b

Generic implications of assigning conflicting multiple responsibilities (Refer to Enclosure 2)

Summary

On November 26, 1991, the NRC issued Information Notice 91-77, "Shift Staffing at Nuclear Power Plants," to alert licensees to the problems that could result from inadequate controls to ensure that shift staffing is sufficient to accomplish all necessary functions required by an event. On June 29, 1993, the staff informed the Commission of the findings from the staff's review of current shift staffing practices in SECY 93-184, "Shift Staffing at Nuclear Power Plants." The staff concluded that all licensees meet the minimum staffing requirements stated in 10 CFR 50.54(m). The staff did not recommend that the Commission take action pertaining to shift staffing at this time. However, the staff continues to monitor plant events with respect to the adequacy of licensee shift staffing and task allocation. The staff (NRR and RES) previously had identified a need for further research on staffing levels and task allocation, which will be completed in 1995. (Since this item is being followed under a separate study, this staff action is considered closed and will not appear in the January 1994 update.)

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Action 2

Assessment of essential chilled water system, including chiller units (Refer to Enclosure 3)

Summary

The licensee has completed, but not submitted, an engineering analysis of essential chiller operation during low-load conditions. Receipt of this document is expected in November 1993. The task action plan for the review of the information is provided in Enclosure 3. Based on the staff's understanding of the safety significance of this issue, we consider a regional assessment of essential chiller operability to be sufficient for restart. (Because of the site-specific nature of this staff action, this item will be updated in January 1994.)

Action 4

Assessment of tornado dampers and their periodic testing (Refer to Enclosure 4)

Summary

It appears that the effect of positive wind pressure from a tornado on heating, ventilation, and air conditioning (HVAC) dampers may not have been considered at South Texas and other plants. Moreover, there do not appear to be any standards for testing of the dampers. This issue will require long-term study and evaluation, including contractor support. Enclosure 4 outlines a task action plan for resolution of the issue. The staff has concluded that resolution of this issue is not a restart item. (Because this is an emerging technical issue, use of this vehicle to inform you of its status is no longer appropriate. The Mechanical Engineering Branch will begin to track this issue independent of resolution of these staff actions. As a result, this item will not appear in the January 1994 update.)

Action 5

Assessment of rapid refueling system with rod-lockout condition and analysis of boron dilution event (Refer to Enclosure 5)

Summary

The licensee and its vendor have evaluated this issue and concluded that the boron dilution analysis performed for South Texas remains applicable for the rods-out configuration. The staff has requested that the licensee provide the vendor's reanalysis of the boron dilution event during Mode 5 with all rods out for staff review. Final determination of this action will occur within six weeks after receipt of the necessary review information. It is expected that the requested information will be supplied in November 1993 and a meeting may be necessary. (Because of the site-specific nature of this staff action, this item will be updated in January 1994.)

Action 6

Evaluate the emergency diesel generator high-pressure fuel injection pump hold-down studs and associated operability analysis (Refer to Enclosure 6)

Summary

The licensee provided an operability analysis that justifies operation of the diesel engine with one cylinder not firing. On the basis of this review, it is not clear whether the emergency diesel generator would remain operable with multiple inoperable cylinders during accident conditions. The staff has requested additional information. Additionally, the staff has requested information on the root-cause investigation of the hold-down stud failures and other vendor data. The staff expects to receive this information in November 1993 and complete the review of this staff action in March 1994. (Because of the site-specific nature of this staff action, this item will be updated in January 1994.)

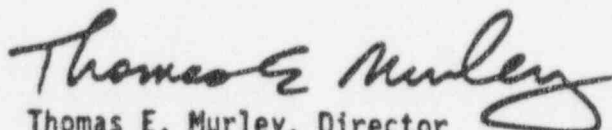
Action 7

Evaluate applicability of technical specification overtime requirements for plants on 12-hour shifts (Refer to Enclosure 2)

Summary

The staff has approved a specific technical specification amendment to accommodate 12-hour shifts by allowing for a "nominal" 40-hour work week. The fundamental objective of the NRC policy on nuclear power plant staff working hours, regardless of shift duration, is to prevent situations where fatigue could reduce the ability of operating personnel to keep the reactor in a safe condition. The staff recognizes that licensees with operating crews on 12-hour shift rotations may need to employ different scheduling practices than those licensees using 8-hour shift rotations. The staff concludes that current NRC guidance is applicable to 12-hour shift rotations and additional guidance is not appropriate. (This item is considered closed and will not appear in the January 1994 update.)

In regard to Staff Actions 1.a, 3, and 8, Region IV has the lead with assistance from NRR and AEOD, as appropriate. As noted earlier, a separate memorandum from the technical lead will address these items.



Thomas E. Murley, Director
Office of Nuclear Reactor Regulation

Enclosures:

1. Memorandum dtd. 8/3/93, Taylor to Murley
2. Memorandum dtd. 10/14/93, Lange to Black
3. Memorandum dtd. 10/21/93, McCracken to Kokajko
4. Memorandum dtd. 10/14/93, Norberg to Kokajko
5. Memorandum dtd. 10/15/93, Jones to Kokajko
6. Memorandum dtd. 10/18/93, Norberg to Black

cc w/enclosures:

- E. Jordan, AEOD
- J. Milhoan, Region IV
- S. Rubin, AEOD

DISTRIBUTION:

Docket File (50-498/50-499)
 PDIV-2 Reading
 TMurley/FMiraglia
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OFFICE	NRR:PDIV-2	NRR:PDIV-2	NRR:PDIV-2	TECH ED	2 10/26/93 DRPW:ADR/85
NAME	EPeyton	LKokajko	SBlack	DGable	EAdensam
DATE	10/22/93	10/22/93	10/22/93	10/22/93	10/22/93
OFFICE	DRPW:DIR ^{10/26}	ADP	NRR:DIR		
NAME	JRoe	JGPartlow	TMurley		
DATE	10/26/93	10/28/93	10/1/93	/ /	/ /

ADT
 W. Russell
 10/28/93

10/26/93
 10/29



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

August 3, 1993

MEMORANDUM FOR: Thomas E. Murley, Director, NRR
 James L. Milhoan, Regional Administrator, RIV
 Edward. L. Jordan, Director, AEOD

FROM: James M. Taylor
 Executive Director for Operations

SUBJECT: STAFF ACTIONS RESULTING FROM THE DIAGNOSTIC EVALUATION AT
 SOUTH TEXAS PROJECT

A copy of the report for the subject evaluation and the proposed staff actions were transmitted to you by previous memoranda. The report documents performance deficiencies and probable root causes, together with findings and conclusions which form the basis for identifying followup actions.

The purpose of this memorandum is to identify and assign responsibility for generic and plant-specific actions resulting from the diagnostic evaluation at South Texas Project. You are requested to resolve each of the items in your area of responsibility and, if appropriate, identify additional staff actions or revisions to the identified actions based on your review of the report. Based on briefings on the diagnostic evaluation results, I recognize that actions to address some of these issues may already have been initiated by the staff.

In view of the importance of this subject, your offices should monitor and track the status of each assigned action item until final resolution. Within 90 days, please provide a written summary of the schedule and status of each item within your area of responsibility, as identified in the enclosure, or that you have additionally identified. Further, I request that you provide a written status report on the disposition of your items (and anticipated actions for uncompleted items) by the end of January each calendar year, until all items are resolved. Every effort should be made to resolve these issues promptly. Copies of all status reports should be forwarded to Stuart Rubin (Branch Chief, DEIIB, AEOD) to facilitate AEOD's responsibility for independent verification.

If there are any questions regarding individual action items, please contact Stuart Rubin (492-4147).

James M. Taylor
 James M. Taylor
 Executive Director for Operations

Enclosure:
 As stated

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NRC STAFF ACTIONS: SOUTH TEXAS PROJECT

1. ISSUE: A number of operator workload issues were raised as a result of the diagnostic evaluation at STP. Given the conditions that were prevalent at STP, the design of the facility, and operator workarounds, the scope of responsibilities and administrative work of the operating staff was excessive. For example, the team concluded that operator staffing, although it exceeded TS minimum requirements, was strained in accomplishing the complex tasks for a scenario involving shutdown from outside the control room.

ACTIONS: (a) Assess operating staff workload issues at STP and the management actions to resolve them.

RESPONSIBLE OFFICE: Region IV

- (b) Assess the generic implications of assigning conflicting multiple responsibilities to the operating staff for response to resource-intensive accidents such as fire brigade responsibilities plus support for shutdown from outside the control room.

RESPONSIBLE OFFICE: NRR

2. ISSUE: The capability of the essential chilled water (ECW) system to perform its safety function during a design basis accident under low heat load conditions was never demonstrated, either through system testing or engineering analysis. The system design cooling capacity of 450 tons per train exceeds the requirements for the highest expected heat load, and greatly exceeds the expected heat load for cold weather conditions. The licensee has experienced surging and vibration of chillers, particularly when throttling ECW flow because of cool weather conditions. If an accident occurred during cold weather and all chillers operated as designed, in response to an engineered safety feature actuation, the chillers would be significantly under-loaded, potentially causing surging and failure. Failure of the chillers would result in loss of ECW system cooling of safety-related equipment. The piping design configuration did not allow the system to be tested with heat loads representative of those anticipated during accident conditions. The licensee indicated that the existing analysis did not adequately address the issue of

chiller operation during a design basis accident under low heat load conditions, and agreed to perform an engineering analysis by September 1993.

ACTIONS: (a) Assess the licensee's engineering analysis for chiller operation under low heat load accident conditions.

RESPONSIBLE OFFICE: NRR

(b) Assess the need and scope of baseline testing of the ECW system that would more closely simulate design basis accident heat load conditions and validate operability. Issue generic correspondence as appropriate.

RESPONSIBLE OFFICE: NRR

(c) Assess the need and scope of periodic testing of the ECW system to ensure that it can perform its safety function. Issue generic correspondence as appropriate.

RESPONSIBLE OFFICE: NRR

3. ISSUE: A limited review of the fire protection area identified deficiencies at STP associated with: the fire protection computer alarm system and operator training on the system, a large backlog of service requests on fire protection systems, control of transient combustibles in the plant, and fire brigade leader qualification. STP management did not oversee and direct the efforts to resolve the above deficiencies in a timely manner.

ACTION: Conduct a followup inspection of the fire protection deficiencies at STP.

RESPONSIBLE OFFICE: Region IV with NRR assistance

4. ISSUE: At STP collapse of the HVAC ductwork would prevent cooling of safety-related components and systems. To protect the HVAC ductwork from collapse during a tornado, the outside ventilation intake dampers are designed to close automatically within .25 seconds, at a differential pressure of 3 psi. Thirty dampers had not been tested to verify that they would operate as designed. An STP

preventive maintenance action was scheduled on a ten year frequency, but had not yet been performed. STP agreed to motion test the dampers to verify operability.

ACTIONS: (a) Evaluate the licensee's surveillance test procedures and results.

RESPONSIBLE OFFICE: NRR

(b) Assess the extent and frequency of damper motion testing at licensed facilities. Evaluate the need to establish technical specification damper motion testing requirements, and subsequent motion testing of ventilation dampers affecting safety-related equipment. Issue requirements as appropriate.

RESPONSIBLE OFFICE: NRR

(c) Assess the need and scope of periodic testing of the dampers to ensure that they can perform their safety function. Issue guidance as appropriate.

RESPONSIBLE OFFICE: NRR

5. ISSUE: STP has a unique design feature called "the rapid refueling system." This system was designed with a "one-lift concept" in which the missile shield, reactor vessel head, upper core-support structure, and rod cluster control assemblies would be removed as a single unit. One feature of this design was to withdraw all of the rod cluster control assemblies into the head and upper internals package where they would be held for the duration of the refueling process. This feature was called "rod lockout" and was usually performed with the plant in mode 5. However, the licensee has documentation from Westinghouse (dated June 17, 1992) that indicated that the safety analysis for the boron dilution event did not address the condition with the control rods fully out in mode 5. Additionally, there were no TS requirements governing mode restrictions for this operation.

ACTIONS: (a) Evaluate the adequacy of the safety analysis associated with the rapid refueling method at STP with the control rods "locked out."

RESPONSIBLE OFFICE: NRR

- (b) Evaluate the adequacy of the STP TS during rapid refueling activities. Take licensing action as appropriate.

RESPONSIBLE OFFICE: NRR

6. ISSUE: At STP nine failures of standby diesel generator (SDG) high pressure fuel injection pump hold down studs occurred from 1987 through 1993. Each time a failure occurred, the SDG was declared inoperable. Subsequent licensee operability reviews determined that failure of the fuel injector hold down studs would render the associated cylinder inoperable, but would not render the SDG inoperable. The licensee received correspondence from Cooper-Bessemer indicating that as many as 2 cylinders could be out of service and the SDG would still be operable. However there was no analysis available for team review.

The licensee attributed the failures to various root causes such as, faulty material, use of improper installation tools and improper lubrication of the hold down studs prior to torquing. Preliminary indications from the licensee also indicated that other utilities with Cooper-Bessemer SDGs have experienced fuel injector hold down stud failures. However, to date no formal industry notification has been issued by the licensee or the vendor.

- ACTIONS: (a) Evaluate the licensee's SDG operability analysis for various scenarios involving multiple inoperable cylinders during accident conditions.

RESPONSIBLE OFFICE: NRR

- (b) Evaluate the need to provide additional generic regulatory correspondence for multiple fuel injector hold down stud failures. Issue guidance as appropriate.

RESPONSIBLE OFFICE: NRR

7. ISSUE: The standard TS guidance regarding overtime appears to have been developed based on a normal 8-hour shift. The licensee was on site-wide 12-hour shifts. As a result, any need to hold an operator over resulted in exceeding the TS overtime guidance by working more than 24 hours in

a 48 hour period. This situation had occurred relatively frequently, largely because of minimally staffed shift crews.

ACTION: Evaluate the applicability of TS overtime requirements for plants on 12-hour shifts. Issue additional guidance as appropriate.

RESPONSIBLE OFFICE: NRR

8. ISSUE: In the transmittal letter forwarding the diagnostic evaluation report, HL&P was requested to review the report and respond within 60 days describing actions they intend to take to address root causes of identified weaknesses.

ACTION: Review and evaluate the licensee's response to the diagnostic evaluation report for completeness. Prepare an appropriate reply for EDO signature.

RESPONSIBLE OFFICE: Region IV, with assistance from NRR and AEOD



UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 WASHINGTON, D.C. 20585-0001

October 14, 1993

MEMORANDUM FOR: Suzanne C. Black, Director
 Project Directorate IV-2
 Division of Reactor Projects III/IV/V

FROM: David J. Lange, Acting Chief
 Human Factors Assessment Branch
 Division of Reactor Controls
 and Human Factors

SUBJECT: SOUTH TEXAS PROJECT 1/2 - DET FOLLOW-UP STAFF ACTIONS
 (TAC NO. M87165/M87166)

As requested in a memorandum dated August 3, 1993 from James M. Taylor to Thomas E. Murley, the Human Factors Assessment Branch (HHFB) has reviewed the generic and plant-specific items within HHFB's area of responsibility which resulted from the diagnostic evaluation at South Texas Project. The following information is provided to identify staff actions and resolution of each of these items for inclusion in the first status report due on October 29, 1993.

Item: 1.(b) Assess the generic implications of assigning conflicting multiple responsibilities to the operating staff for response to resource-intensive accidents such as fire brigade responsibilities plus support for shutdown from outside the control room.

On November 26, 1991, the NRC issued Information Notice 91-77 (IN 91-77), "Shift Staffing at Nuclear Power Plants," to alert licensees of the problems that could result from inadequate controls to ensure that shift staffing is sufficient to accomplish all necessary functions required by an event. IN 91-77 called attention to the practice of many licensees of assigning operating staff personnel multiple responsibilities which could impact their ability to perform all of the necessary actions specified in the licensee's administrative controls and required by an event. IN 91-77 stated that licensees may wish to carefully review actual staffing needs to ensure that sufficient personnel are available to adequately respond to all events.

Results of a survey by NUMARC indicated that most licensees conducted a staffing review following IN 91-77 and affirmed the adequacy of their existing staffing practices. However, additional operating events and DET results continued to raise questions in this area. Therefore, HHFB continued assessment of the generic implications of assigning conflicting multiple responsibilities to the operating staff for response to resource-intensive accidents as part of the HHFB review of shift staffing practices. On June 29, 1993, the staff informed the Commission of the findings from the staff's review of current shift

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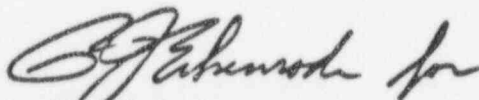
October 14, 1993

staffing practices in SECY-93-184, "Shift Staffing at Nuclear Power Plants." The staff concluded that at present, all licensees meet the minimum staffing requirements stated in 10 CFR 50.54(m). Additionally licensees generally staff to levels greater than required by either regulation or technical specifications using non-licensed and licensed personnel. The staff did not recommend that the Commission take action pertaining to shift staffing at that time. However, the staff continues to monitor plant events with respect to the adequacy of licensee shift staffing and task allocation. Furthermore, the staff identified a need for further research on staffing levels and task allocation and will review the results of that research which is scheduled for completion in 1995.

- Item: 7. Evaluate the applicability of TS overtime requirements for plants on 12-hour shifts. Issue additional guidance as appropriate.

Since the NRC's nuclear power plant staff working hours policy was promulgated by Generic Letter 82-12, "Nuclear Power Plant Staff Working Hours," on June 15, 1982, 12-hour shift rotations have become more common at commercial nuclear power plants. As a result, the staff has approved specific amendments to plant technical specifications to accommodate 12-hour shift rotations by allowing for a "nominal" 40-hour work week. The fundamental objective of the NRC policy on nuclear power plant staff working hours, irrespective of shift duration, is to prevent situations where fatigue could reduce the ability of operating personnel to keep the reactor in a safe condition. To that end, "Enough plant operating personnel should be employed to maintain adequate shift coverage without routine heavy use of overtime." The staff recognizes that to meet this objective licensees with crews on 12-hour shift rotations may need to employ different scheduling or staffing practices than licensees using 8-hour shift rotations. Nevertheless, the fundamental policy objective and specific guidelines for limiting overtime hours (e.g., "An individual should not be permitted to work more than 16 hours in any 24-hour period, ... excluding shift turnover.") are appropriate and applicable to 12-hour shift rotations.

The staff concludes that current NRC guidance is applicable to 12-hour shift rotations, and additional guidance is not appropriate.



David J. Lange, Acting Chief
Human Factors Assessment Branch
Division of Reactor Controls
and Human Factors

cc: L. Kokajko
W. Swenson



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20585-0001

OCT 21 1993

MEMORANDUM FOR: Lawrence Kokajko, Senior Project Manager
Project Directorate IV-2
Division of Reactor Projects III, IV, V

FROM: Conrad E. McCracken, Chief
Plant Systems Branch
Division of Systems Safety and Analysis

SUBJECT: SOUTH TEXAS PROJECT DET STAFF ACTIONS
(TAC NOS. M87165 and M87166)

As requested, Plant Systems Branch has developed a schedule for review and resolution of staff action number 2 resulting from the diagnostic evaluation at South Texas Project. We intend to begin our review once the engineering analysis of essential chiller operation is received from Houston Lighting and Power Company, the licensee for South Texas Project. The proposed schedule is also impacted by a high priority review of a multi-plant action regarding the adequacy of spent fuel pool cooling. The following schedule is based on receipt of the engineering evaluation by November 1, 1993:

ACTION	DATE
(1) Begin an evaluation of the essential chiller engineering analysis.	November 1, 1993
(2) Issue a request for additional information, if necessary.	December 10, 1993
(3) Issue a safety evaluation regarding operation and testing of essential chillers under low heat load conditions.	April 15, 1994
(4) Draft an information notice regarding essential chill water system performance at South Texas Project, if considered appropriate.	May 6, 1994

Based on our understanding of the safety significance of this issue, we consider a regional assessment of essential chiller operability to be sufficient for restart. Please contact Steve Jones at 504-2833 if you have any questions regarding our proposed schedule.

Conrad E. McCracken, Chief
Plant Systems Branch
Division of Systems Safety and Analysis

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UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 WASHINGTON, D.C. 20542-0001

Docket Nos.: 50-498/50-499 OCT 14 1993

MEMORANDUM FOR: Lawrence E. Kokajko, Project Manager
 Project Directorate IV-2
 Division of Reactor Projects III/IV/V

FROM: James A. Norberg, Chief
 Mechanical Engineering Branch
 Division of Engineering

SUBJECT: ACTION PLAN FOR HVAC DAMPER TESTING--STAFF ACTION 4
 RESULTING FROM THE DIAGNOSTIC EVALUATION AT SOUTH TEXAS
 PROJECT (TAC NOS. M87165 AND M87166)

The Diagnostic Evaluation (DE) Team's findings and observations at South Texas Project (STP) identified a number of follow-up actions, one of which was damper testing. The memorandum dated August 3, 1993, from James M. Taylor, EDO, assigned responsibility for generic and plant-specific actions resulting from the diagnostic evaluation at STP. The memorandum requested that the actions be resolved, and, if appropriate, the staff identify additions or revisions to the actions.

The enclosed Action Plan concerns follow-up issue 4 on HVAC damper testing, which is described in the August 3, 1993, memorandum as follows:

At STP, collapse of the HVAC ductwork would prevent cooling of safety-related components and systems. To protect the HVAC ductwork from collapse during a tornado, the outside ventilation intake dampers are designed to close automatically within 0.25 seconds, at a differential pressure of 3 psi. Thirty dampers had not been tested to verify that they would operate as designed. An STP preventative maintenance action was scheduled on a ten-year frequency, but had not yet been performed. STP agreed to motion test the dampers to verify operability.

- Action 4(a): Evaluate the licensee's surveillance test procedures and results.
- Action 4(b): Assess the extent and frequency of damper motion testing at licensed facilities. Evaluate the need to establish technical specification damper motion testing requirements, and subsequent motion testing of ventilation dampers affecting safety-related equipment. Issue requirements as appropriate.
- Action 4(c): Assess the need and scope of periodic testing of dampers to ensure that they can perform their safety function. Issue guidance as appropriate.

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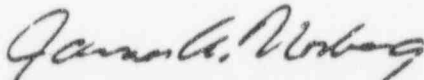
The Code of Federal Regulations, 10 CFR 50 Appendix A, GDC-1, "Quality Standards and Records," and Appendix B, Criterion XI, "Test Control," call for testing of all components, such as dampers, necessary for safe operation to demonstrate that they will perform satisfactorily in service. Following a finding by the DET that safety-related dampers were not being tested, the STP committed to include manual stroking of tornado damper blades as part of their maintenance procedure at a frequency of every 10 years. The DET in effect questioned whether the methodology, frequency, and acceptance criteria (if any) of this "maintenance action" meet GDC-1 and Criterion XI. In particular, the surveillance frequency of every 10 years stands out as a very long surveillance interval when compared to those of related components (e.g., valves) and HVAC systems specified in the technical specifications. The surveillance tests in the technical specifications may involve damper operations during HVAC systems testing. However, specific NRC requirements or guidelines for damper testing are limited; and the extent and the frequency of damper testing by licensees in general are not known.

There is a lack of documentation in the STP FSAR, and possibly in other plant FSARs, relating to the effects of positive wind pressure from tornadoes on ventilation systems. Such an omission would not be consistent with SRP 3.3.2, "Tornado Loading," which requires the inclusion of tornado wind pressure in the design evaluation. This follow-up action may reveal instances where safety-related dampers are not effectively designed to meet design bases conditions, such as tornado wind pressure, at licensed facilities.

Action 4(a), which concerns only STP, cannot be considered complete until the generic issues on damper testing are evaluated as part of Actions 4(b) and (c). Actions 4(b) and (c) require assessing the extent and frequency of safety-related damper testing at licensed facilities and evaluating the need for, and issuing as necessary, technical specification requirements and guidance. Contractor technical assistance may be required to complete this item.

Action 4(a) should not be a restart issue for STP, which is currently in an outage, because (1) the problem is generic, (2) the appropriate corrective action has not been determined by the staff, and (3) the problem is not believe to pose an immediate threat to safety.

This action is being reviewed by the Mechanical Engineering Branch under TAC Numbers M87165 and M87166.


James A. Norberg, Chief
Mechanical Engineering Branch
Division of Engineering

Enclosure:
Action Plan

ACTION PLAN
STAFF ACTION #4 RESULTING FROM THE DIAGNOSTIC EVALUATION
AT SOUTH TEXAS PROJECT
OCTOBER 1993

DAMPER TESTING

1. DESCRIPTION OF PROBLEM

The Diagnostic Evaluation (DE) Team's findings and observations at South Texas Project (STP) identified a number of follow-up actions, one of which was damper testing. The memorandum dated August 3, 1993, from James M. Taylor, EDO, assigned responsibility for generic and plant-specific actions resulting from the diagnostic evaluation at STP. The memorandum requested that the actions be resolved, and, if appropriate, the staff identify additions or revisions to the actions.

Action 4 in the memorandum from James M. Taylor, EDO, involves safety-related HVAC (heating, ventilating, and air conditioning) damper testing and is described as follows:

At STP, collapse of the HVAC ductwork would prevent cooling of safety-related components and systems. To protect the HVAC ductwork from collapse during a tornado, the outside ventilation intake dampers are designed to close automatically within 0.25 seconds, at a differential pressure of 3 psi. Thirty dampers had not been tested to verify that they would operate as designed. An STP preventative maintenance action was schedule on a ten-year frequency, but had not yet been performed. STP agreed to motion test the dampers to verify operability.

Action 4(a): Evaluate the licensee's surveillance test procedures and results.

Action 4(b): Assess the extent and frequency of damper motion testing at licensed facilities. Evaluate the need to establish technical specification damper motion testing requirements, and subsequent motion testing of ventilation dampers affecting safety-related equipment. Issue requirements as appropriate.

Action 4(c): Assess the need and scope of periodic testing of dampers to ensure that they can perform their safety function. Issue guidance as appropriate.

The Code of Federal Regulations, 10 CFR 50 Appendix A, GDC-1, "Quality Standards and Records," and Appendix B, Criterion XI, "Test Control," call for testing of all components, such as dampers, necessary for safe operation to demonstrate that they will perform satisfactorily in service. The Regulations require that the test program shall include, as appropriate, tests prior to installation and during operation and that records of such testing be maintained. The Technical Specifications surveillance tests may involve damper operation during HVAC systems testing. However, specific NRC requirements or guidelines for damper

testing are limited; and the staff is not familiar with the extent and the frequency of damper testing by licensees.

The information for Action 4(a) regarding surveillance test procedures and results will be provided by the licensee. However, such information may not be readily available since the dampers had not been tested at STP and the proposed "maintenance action" may not adequately test dampers to verify operational readiness. Following a finding by the DE that safety-related dampers were not being tested, the STP committed to include manual stroking of tornado damper blades as part of their maintenance procedure at a frequency of every 10 years. The DE in effect questioned whether the methodology, frequency, and acceptance criteria (if any) of this "maintenance action" meet GDC-1 and Criterion XI. In particular, the surveillance frequency of every 10 years stands out as a very long surveillance interval when compared to those of related components (e.g., valves) and HVAC systems specified in the technical specifications.

There may be instances where safety-related ventilation systems are not effectively designed and qualified to meet design bases conditions, such as positive wind pressure from tornadoes, at licensed facilities. The tornado dampers at STP were apparently not designed for the effects of positive wind pressure from tornadoes. This omission is not consistent with SRP 3.3.2, "Tornado Loading," which requires the inclusion of tornado wind pressure in the design evaluation. The potential for inadequate design specifications and qualification testing for positive wind pressure from tornadoes requires further study.

Action 4(a), which pertains specifically to STP, cannot be considered complete until damper testing is evaluated generically as part of Actions 4(b) and (c). Actions 4(b) and (c) require assessing the extent and frequency of safety-related damper testing at licensed facilities and evaluating the need for, and issuing as necessary, technical specification requirements and guidance.

2. PLAN FOR PROBLEM RESOLUTION

The program for resolution of Action 4 consists of 3 tasks: (1) evaluate the need for technical specification requirements and guidance by assessing the extent and frequency of safety-related damper testing at licensed facilities; (2) assess the adequacy of design specifications and qualification testing to meet design basis conditions for a representative sample of safety-related damper designs and vendors; (3) develop, if necessary, requirements and guidelines for damper testing, covering areas such as methodology, frequency, and acceptance criteria. Tasks (1) and (2) can proceed in parallel. Task (3) will proceed if a determination is made during Tasks (1) and (2) that there is a need to develop requirements and/or guidelines.

Task 1. Extent of Damper Testing at Licensing Facilities and Need for Technical Specification Requirements and Guidance

Information regarding the testing of safety-related damper at licensed facilities will be obtained. The plant data obtained should include: (1) list of all safety-related dampers; (2) description of dampers, such as the type and how the

devices work; (3) description of testing performed, including acceptance criteria, methodology, plant mode required for testing, and frequency; (4) estimate of time required to perform various type of tests, (5) maintenance, failure, and corrective action history, and (6) description of safety function for each damper. This data will be assessed to evaluate the need for Technical Specification requirements and guidance such as Information Notice, Generic Letter, or Bulletin. The assessment will include backfit analysis, if necessary.

The data will be analyzed to determine: (1) the fraction of safety-related dampers tested; (2) whether the tests require evaluation of test data against previous test results; (3) whether the tests require verification of each safety function; (4) whether the tests require verification at design basis conditions, or combined test and analysis if not at design basis conditions, and (5) for dampers that are not tested, the consequences of assuming dampers are not operable in design bases scenarios.

The evaluation will include review of generic information available relative to component level testing of safety-related dampers. GDC-1 and Criterion XI address testing of components in general terms. ASME AG-1, "Code on Nuclear Air and Gas Treatment," and AMCA 500, "Test Methods for Louvers, Dampers, and Shutters," include sections on dampers. The testing of safety-related HVAC systems required in the New Standard Technical Specifications may include some damper operation. For valves, which are similar in function to dampers, specific testing requirements are delineated in the ASME Code Section XI, which the licensees are required to meet per 10 CFR 50.55a.

The evaluation of the need for effective damper testing requirements and guidelines will include probabilistic risk assessment (PRA). Some failure data analyses will be performed to ensure agreement with failure estimates in existing PRAs. Sources of data could include FSARs, operating experience searches, plant inspections, NUDOCS, P&IDs, NUREGS, RGs, and reports from outside organizations.

Recently, an EPRI report (TR 102240) assessed the feasibility of revisions to the ASME Code Section XI, which would require that inservice valve testing verify all safety functions, and be performed at or near design basis conditions. The report found that such revisions are not cost effective. This finding was based on probabilistic risk assessment and the failure data which were used to estimate the potential reduction in public risk. A similar finding may not be appropriate for damper testing since (1) the NRC requirements and guidelines are not established for damper testing as they are for valve, and (2) the failure data for dampers may be different and limited in availability; however, this EPRI report, taken in proper context, should be referenced.

Task 2. Adequacy of Design Specifications and Qualification Testing and Need for NRC Guidance

The objective of this task is to assess the adequacy of design specifications and qualification testing to meet design basis conditions for safety-related damper. The data needed will be obtained from licensees and/or vendors via site visits, phone calls, and correspondence. The data should be sufficiently detailed to show that dampers can meet their design bases conditions. If problem areas are

apparent, the need for NRC guidance will be evaluated. The assessment will include backfit analysis, if necessary.

We expect that design specifications and qualification testing for dampers should have considered applicable parameters such as stroke times and leakage limits as specified in Section XI for certain type of valves. Qualification testing should have verified all safety functions and should have been performed at or near design basis conditions. Any assumptions used in the verification of functional capability should have been supported by sound bases. In the case of MOVs, which may be compared to some types of dampers, there were many instances where inadequate qualification criteria resulted in inadequate capability under design basis conditions.

The safety functions of dampers include providing isolation from the effects of tornadoes, radiation, fire, and toxic gases, and flow control and diversion in cooling and filtration systems. Sources of data on design and qualification criteria include FSAR, SER, operating experience searches, information notices, NUDOCS, plant and vendor inspections, PAID's, SRPs, NUREGS, RGs, and reports from outside organizations, such as ASME AG-1, AMCA 500, ANSI/ASME N509, ANS 59.2, and NFPA 90.A.

The HVAC systems design at STP may not have considered the effects of tornado wind pressure. The lack of documentation in this area would not be consistent with SRP 3.3.2, "Tornado Loading," and a report by John A. Shanahan, "Evaluation of and Design for Extreme Tornado Phenomena," Proceeding of the Symposium on Tornadoes, 1976, p. 273. The report by Shanahan states as follows:

Design of ventilation systems in the past have concentrated on the effects induced by the tornado pressure drop. In actuality, ventilation systems are as sensitive to tornado wind as they are to pressure drop since they cannot distinguish between the two. Ventilation design should consider the effects of location of ports, tornado wind and pressure drop.

The risk estimates of damage to safety-related HVAC system from tornado wind pressure should be included in the assessment of the adequacy of design specifications and qualification testing for capability to perform design basis functions.

Task 3. If Necessary, Develop Technical Specifications and Guidance

Work performed under Tasks 1 and 2 may indicate that there is a need for specific requirements and guidelines to verify the functional capability of safety-related dampers. If there is a need, this task will develop and assist in issuing, as appropriate, technical specification requirements and guidelines such as Information Notice, Generic Letter, or Bulletin. The guidance appropriate to the results of the work in Tasks 1 and 2 in the form of Information Notice, Generic Letter, or Bulletin will be prepared.

3. TECHNICAL ORGANIZATIONS INVOLVED

This section indicates the responsibilities of each NRR branch in supporting the South Texas 1 & 2 Diagnostic Evaluation Team follow-up staff Action 4.

- A. Mechanical Engineering Branch, Division of Engineering, has the lead responsibility for this action and for maintaining schedule for completion of all work.

Manpower Estimate:	FY-94	0.2 professional staff year (psy)
	FY-95	0.2 psy
	FY-96	0.2 psy

- B. Civil Engineering and Geosciences Branch, Division of Engineering, will provide input and comments relative to its review areas as defined for the SRPs.

Manpower Estimate:	FY-94	0.1 psy
	FY-95	0.1 psy
	FY-96	0.02 psy

- C. Probabilistic Safety Assessment Branch, Division of Systems Safety and Analysis, will provide input and comments pertaining to probabilistic risk assessment.

Manpower Estimate:	FY-94	0.1 psy
	FY-95	0.1 psy
	FY-96	0.02 psy

- D. Division of Reactor Projects will provide the coordination necessary to assist assembling information on safety-related dampers from licensed facilities.

Manpower Estimate:	FY-94	0.1 psy
	FY-95	0.1 psy
	FY-96	0.0 psy

	<u>FY-94</u>	<u>FY-95</u>	<u>FY-96</u>
Contract Dollars for Technical Assistance	\$50k*	\$50k**	0

*Not currently included in the Division of Engineering technical assistance planning and budgeting.

**Does not include funding for a backfit analysis if determined to be necessary

4. SCHEDULE

Task 1:

Obtain plant data on damper testing	01/15/94
Receive draft report from contractor	11/15/94
Provide staff comments to contractor	12/15/94
Receive final report from contractor	02/01/95

Task 2:

Obtain plant and vendor data on design and qualification testing	04/15/94
Receive draft report from contractor	08/01/94
Provide staff comments to contractor	09/01/94
Receive final report from contractor	10/15/94

Task 3 (if necessary, as determined in Tasks 1 and 2):

Receive draft tech spec requirement and/or guidance from contractor	03/30/95
Provide initial staff comments to contractor	05/15/95
Finalize and issue tech spec requirements and/or guidance	05/15/96

5. INTERACTION WITH OUTSIDE ORGANIZATIONS

This action will involve interactions with outside organizations such as utilities, contractors, HVAC vendors, and damper vendors. Other organization such as American Society of Mechanical Engineers and Electric Power Research Institute may be contacted.

6. POTENTIAL PROBLEMS

A potential problem area is that failure data for safety-related dampers may be limited because of lack of specific NRC testing requirements. It may be difficult to effectively complete this action without this data.



UNITED STATES
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20585-0001

October 15, 1993

MEMORANDUM FOR: Lawrence E. Kokajko, Project Manager
Project Directorate IV-2
Division of Reactor Projects - III/IV/V

FROM: Robert C. Jones, Chief
Reactor Systems Branch
Division of Systems Safety and Analysis

SUBJECT: SOUTH TEXAS PROJECT 1 AND 2 - DET FOLLOW-UP
STAFF ACTION ITEMS 5(a) AND 5(b)
(TAC NOS. M87165 AND M87166)

The Reactor Systems Branch (SRXB) has the responsibility of resolving Action Items 5(a) and 5(b) which are identified in the memo from James M. Taylor, dated August 3, 1993. The scope of staff actions for these two items are as follows:

- 5(a) Evaluate the adequacy of the safety analysis associated with the rapid refueling method at STP with the control rods "locked out."
- 5(b) Evaluate the adequacy of the STP technical specification during rapid refueling activities. Take licensing action as appropriate.

These staff action items were raised by the Diagnostic Evaluation Team for the South Texas Project Electric Generating Station (STPEGS). The STPEGS has a unique design for a rapid refueling system which calls for withdrawal of all of the rod cluster control assemblies into the head and upper internals package where they are held for the duration of the refueling process. This feature is called "rod lockout" and is usually performed with the plant in Mode 5 prior to refueling. However, the original safety analysis for the boron dilution event documented in Section 15.4.6 of UFSAR did not consider the condition with all the control rods fully out in Mode 5. Also, there are no TS requirements governing restrictions for this operation.

The above stated safety concern was discovered by the licensee and reported in its Station Problem Report (SPR) No. 920066 dated February 21, 1992. In a letter dated March 9, 1992, the licensee requested that Westinghouse perform a review to ensure that all aspects of rapid refueling have been adequately considered in the STPEGS design and safety analysis. The licensee also provided Westinghouse with a summary of the operational steps used at STPEGS for rapid refueling. In response to the licensee's request, Westinghouse in its letter dated June 17, 1992, indicated that the boron dilution analysis performed for the STPEGS past and current cycles remains applicable for the rods

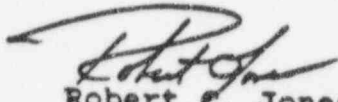
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Lawrence E. Kokajko

- 2 -

out configuration. To ensure that the all rods out configuration in Mode 5 will be considered in future fuel reloads, Westinghouse has revised the methodology for the analysis of this accident.

We request that the licensee provide the Westinghouse re-analysis of the boron dilution event during Mode 5 with all rods out for staff review. We expect to complete our review of the re-analysis, make a determination regarding the need for technical specifications and document our basis for closing the subject action items approximately six weeks after the receipt of the necessary review information.



Robert E. Jones, Chief
Reactor Systems Branch
Division of Systems Safety and Analysis

cc: A. Thadani
S. Black



UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 WASHINGTON, D.C. 20555-0001

OCT 19 1993

MEMORANDUM FOR: Suzanne C. Black, Project Director
 Project Directorate IV/II
 Division of Reactor Projects

FROM: James A. Norberg, Chief
 Mechanical Engineering Branch
 Division of Engineering

SUBJECT: STAFF ACTIONS RESULTING FROM THE DIAGNOSTIC EVALUATION AT
 SOUTH TEXAS PROJECT (STP)

Reference: 1. Memorandum from James M. Taylor to Thomas E. Murley,
 Director NRR et.al. dated August 3, 1993 relating to
 staff actions resulting from the diagnostic evaluation
 at the South Texas Project.

As requested in the referenced memorandum, the Mechanical Engineering Branch is evaluating Issue No. 6 relating to the fuel injection hold down stud failures in the standby diesel generators (SDGs) at STP. A summary of the status of review and schedule for the disposition of this issue is addressed below.

A number of failures of high pressure fuel injection pump hold down studs occurred from 1987 through 1993 in the SDGs at STP. Each time a failure occurred, the SDG was declared inoperable. Subsequent licensee operability reviews determined that failure of the fuel injector hold down studs would render the associated cylinder inoperable, but would not render the SDG inoperable. The licensee received correspondence from the SDG vendor, Cooper-Bessemer indicating that as many as 2 cylinders could be out of service and the SDG would still be operable. However, there was no analysis available for the Diagnostic Evaluation Team review.

The licensee attributed the failure to various root causes such as, faulty material, use of improper installation tools and improper lubrication of the hold down studs prior to torquing. Preliminary indications from the licensee also indicated that other utilities with Cooper-Bessemer SDGs have experienced fuel injector hold down stud failures. However, to date no formal industry notification has been issued by the licensee or the vendor.

The staff requested the licensee to provide operability analysis for various scenarios involving multiple inoperable cylinders during accident conditions. However, the analysis provided by the licensee justifies operation of the engines with one cylinder not firing. Based on staff review of this operability analysis, it is not clear whether or not the SDG would remain operable under various scenarios involving multiple inoperable cylinders during accident conditions. Additional information is being requested to complete the evaluation.

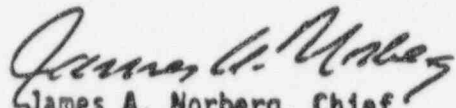
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Suzanne C. Black

- 2 -

The staff is also requesting the licensee to provide additional information on the root cause investigation of the failures and obtain data on similar experience with other Cooper-Bessemer SDGs from the vendor. Based on review of this additional information, the staff will assess the need for issuing generic guidance on this issue. The request for additional information to the licensee is anticipated to be sent by mid-November 1993.

The projected date for the disposition of this issue is March 1994.


James A. Norberg, Chief
Mechanical Engineering Branch
Division of Engineering

cc: L. Kokajko

NOV 12 1993

MEMORANDUM FOR: James L. Milhoan, Regional Administrator
Region IV

FROM: Edward L. Jordan, Director
Office for Analysis and Evaluation
of Operational Data

SUBJECT: AEOD COMMENTS ON THE HOUSTON LIGHTING & POWER COMPANY
RESPONSES TO THE SOUTH TEXAS PROJECT DIAGNOSTIC EVALUATION
REPORT

We have reviewed the Houston Lighting & Power Company (HL&P) responses dated August 28, 1993 and October 15, 1993 to the South Texas Project Diagnostic Evaluation Team (DET) report and consider that they are both comprehensive in scope and responsive to the concerns of the team. Each DET finding has been addressed by the licensee, at least in broad outline, and it is anticipated that additional details will be included in the specific corrective action plans being developed and implemented by HL&P under Region IV oversight.

Original Signed by:
E. L. Jordan

Edward L. Jordan, Director
Office for Analysis and Evaluation
of Operational Data

cc: C. Hehl, RI
W. Beach, RIV
A. Howell, RIV

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20585-0001

December 1, 1993

1
Copy to DE

MEMORANDUM FOR: Thomas E. Murley, Director
Office of Nuclear Reactor Regulation

FROM: James M. Taylor
Executive Director for Operations

SUBJECT: STATUS OF NRR STAFF ACTIONS RESULTING FROM THE DIAGNOSTIC
EVALUATION AT SOUTH TEXAS PROJECT

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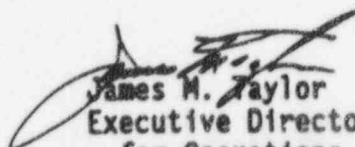
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Your memorandum to me dated November 2, 1993, provided a status of those actions assigned to NRR to resolve findings from the Diagnostic Evaluation Team's review of South Texas Project. I have two comments on that memorandum.

First, your memorandum stated that two of NRR's assigned items (1.b and 4) were not to be further updated in status reports because they were being followed elsewhere. This is contrary to my August 3, 1993, memorandum which assigned responsibility for "generic and plant-specific actions." The memorandum called for "a written status report ... by the end of January each calendar year ... until all items are resolved." Therefore, I request that you include all NRR's open items in the report.

Second, the 1995 and 1996 completion dates for staff action on the two items previously mentioned are excessive. For item 1.b., the agency has been studying shift staffing for many years and should not need another two to reach a conclusion on this issue. I do not believe this is a research issue, but rather a staff management decision issue. For item 4, an early completion of the PRA evaluation of the need for "effective damper testing requirements and guidelines" might show whether the rest of the tasks are needed or not. If the item is not risk-significant, NRC staff time, contractor dollars, and several years on the schedule could be saved.

Please reflect consideration of the foregoing comments in your January 1994 report.


James M. Taylor
Executive Director
for Operations

Call:
1. NRR Point of Contact
2. Jocelyn Mitchell
EDO - RIV & RV
Coordinator

cc: J. Sniezek
E. Beckjord
E. Jordan ✓

By Wed:
New words on SAs

D/23

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