



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

February 5, 1988

MEMORANDUM FOR: L. B. "Tad" Marsh, Chief  
Mechanical Engineering Branch

FROM: Jose A. Calvo, Director  
Project Directorate - IV  
Division of Reactor Projects - III,  
IV, V and Special Projects

SUBJECT: REQUEST FOR ASSISTANCE TO THE SOUTH TEXAS SSAT

The Safety Significance Assessment Team (SSAT) has been following up on technical information made available by allengers through the Government Accountability Project (GAP). Some of the questions raised by this information requires technical judgements that can be made more appropriately by your branch. This memorandum is to request assistance from one or more members of your branch to help in making the necessary technical judgements. The questions are related to the adequacy of methods to resolve non-conformance reports related to components such as the steam generator, the reactor vessel, the reactor coolant pumps, and etc. being out of plumb (verticality). The SSAT will do whatever is required to facilitate a rapid decision making process.

Sincerely,

*Jose A. Calvo*

Jose A. Calvo, Director  
Project Directorate - IV  
Division of Reactor Projects - III,  
IV, V and Special Projects

cc: D. M. Crutchfield  
L. Shao  
J. Richardson

FOIA-88-107

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ABSTRACT

This report provides the results of a review by the Safety Significance Assessment Team (SSAT) of the Nuclear Regulatory Commission (NRC) of alleged construction irregularities at Houston Lighting and Power's South Texas Project (STP), Unit 1 and 2 (Docket Nos. 50-498, 50-499), located in Matagorda County, Texas. These allegations were provided to the NRC by the Government Accountability Project (GAP) which received them from approximately 36 current and former employees of STP, and covered a wide range of concerns with hardware and quality assurance and control, and issues of management, harassment and intimidation and wrongdoing. Only those concerns considered by the SSAT to be technically-oriented and safety-related were selected for review based on their possible safety significance, generic implications, specificity to a particular plant component, system or structure, and to provide a multidiscipline overview of the STP Quality Assurance Program implementation and effectiveness.

The SSAT was not able to identify any technical concern that may have required holding up ongoing operations- or construction-related activities at the STP facility.

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## SAFETY SIGNIFICANCE ASSESSMENT TEAM (SSAT)

The SSAT consisted of thirteen members of the NRC staff who, collectively, represent 340 years of engineering and scientific experience, of which 245 years were in the nuclear field in mechanical, electrical, instrumentation, civil, structural and metallurgical engineering, quality assurance and control, inspection, construction, operations, project management and regulatory activities.

The SSAT members that conducted the STP onsite inspection of alleged deficiencies during the week of January 18-22, 1988 were the same individuals that performed the initial screening of GAP's allegations <sup>in late 1987</sup>. This inspection also involved NRC Region IV and resident inspector personnel who provided background information related to previous inspection activities and substantive support to the SSAT.

Also, the SSAT sought the assistance of the mechanical engineering branch and material engineering branch of NRC's Office of Nuclear Reactor Regulation (NRR) to confirm the adequacy of analysis pertaining to the installation of Nuclear Steam Supply System (NSSS) components. Additional assistance was provided by various NRC offices in matters related to congressional and public affairs, allegation management, allegers interviews, investigations, and legal, editing, administrative, word processing and telephone conference services support. Moreover, the Heritage Reporting Corporation provided assistance to SSAT in recording and transcribing telephone conversation with the allegers.

The SSAT members and other NRC staff that contributed during this review effort are listed below:

### NRC SSAT

<u>Name</u>	<u>Function</u>	<u>Area</u>
J. Calvo	Team Director	
P. O'Connor	Project Manager	Project/Allegation Compilation & Tracking
R. Correia	Team Leader	Technical Overall

NRC SSAT (continued)

<u>Name</u>	<u>Function</u>	<u>Area</u>
J. Durr	Advisor to Team Leader	
W. Johnson	Inspector	Region IV Liason
E. Tomlinson	Deputy Team Leader A	Allegers Interview Arrangements/HVAC
G. Johnson	Reviewer/Inspector	Welding
K. Naidu	Reviewer/Inspector	Electrical and Instrumentation
M. Oliveri	Inspector	Non-Destructive Examination
P. Milano	Deputy Team Leader B	QA/QC
P. Prescott	Reviewer/Inspector	Piping & Mechanical Components
A. Lee	Reviewer/Inspector	Tires
R. Lipinski	Reviewer/Inspector	Civil/Structural
J. Rajan*	Reviewer	Piping & Mechanical Components
H. Ashar*	Reviewer	Civil/Structural

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\*Reviewers participation was limited to the initial review of the allegations at GAP's offices

NRC Region IV and Resident Inspectors Personnel Involved

<u>Name</u>	<u>Function</u>	<u>Area</u>
L. Constable	Support	Inspection
D. Garrison	Support	Inspection
D. Carpenter	Support	Inspection
C. Johnson	Support	Inspection

NRC Region IV and Resident Inspectors Personnel Involved (continued)

<u>Name</u>	<u>Function</u>	<u>Area</u>
W. McNeil	Support	Inspection
E. Hildebrand	Support	Inspection
J. Bess	Support	Inspection

OTHER NRC STAFF

<u>Name</u>	<u>Function</u>	<u>Area</u>
L. B. Marsh	Advisor	Mechanical
P. T. Kuo	Advisor	Mechanical
S. Hcu	Advisor	Mechanical
C. Y. Cheng	Advisor	Materials
K. Wichman	Advisor	Materials
D. Murphy	Advisor	Investigations
<del>R. Brady</del>	<del>Advisor</del>	<del>Allegation Management</del>
<del>R. Newlin</del>	<del>Support</del>	<del>Public Affairs</del>
<del>J. Gilliland</del>	<del>Support</del>	<del>Public Affairs</del>
A. Vietti-Cook	Advisor	Allegers Interviews
<del>F. Combs</del>	<del>Support</del>	<del>Congressional Affairs</del>
N. P. Kadambi	Support	Project Management
P. Noonan	Support	Administrative
S. Ramsey	Support	Administrative
<del>D. Brooks</del>	<del>Support</del>	<del>Telephone Conference</del>
<del>R. Sanders</del>	<del>Support</del>	<del>NUREG Editing</del>
<del>?</del>	<del>Support</del>	<del>NUREG Final Word Processing</del>

Contractors - Heritage Reporting Corporation

Name

Function

Area

J. Rose

Support

Allegers Conversation  
Recording

C. MacGregor

Support

Allegers Conversation  
Recording



## 1. INTRODUCTION AND BACKGROUND

In January 1987, the Government Accountability Project (GAP) informed the NRC that they had begun an investigation into allegations concerning the safety of the South Texas Project (STP). GAP received these safety allegations from approximately 36 current and former employees of STP. GAP informed the NRC that upon completion of the investigation a public report would be issued. GAP advised the NRC that unless it was willing to establish an independent team to process the allegations, GAP would turn over the allegations to the State Attorney General's office, congressional committees, and other regulatory and municipal bodies.

Correspondence followed between the NRC Executive Director of Operations (EDO) and GAP regarding management of the allegations. After repeated requests for the information, the EDO issued a subpoena requesting GAP's attorney, Billie P. Garde, to testify and produce documents regarding the STP allegations. On May 22, 1987, attorneys for GAP and the NRC entered into an agreement. GAP agreed to move to quash the subpoena by May 29, 1987, arguing that compliance with the subpoena would compromise the public health and safety, the EDO has no authority to issue the subpoena, and the attorney-client privilege and work product doctrine preclude divulgement of the information requested.

The NRC agreed to continue the appearance date for the subpoena from May 26, 1987, until 14 days after the decision on the motion to quash, unless the parties agreed on an earlier date. The NRC disagreed with GAP's reasoning to quash the subpoena arguing that the failure of the NRC to obtain the allegations would more likely compromise the public health and safety, particularly if the allegations were substantiated.

The U. S. District Court ruled on October 27, 1987 to deny enforcement of the NRC's subpoena because of the possibility of "abridgement of constitutionally protected associational rights." In addition, the court stated that, "Alternatives minimizing the intrusion on associational rights must be carefully and conscientiously explored before resort may be had to the court's process." Subsequently, an agreement was reached between the EDO and GAP on the main elements of a process that would provide the NRC staff limited access to information which might be of relevance in the forthcoming licensing decisions

regarding STP. On November 19, 1987, a meeting was held in the EDO offices in Bethesda, Maryland with NRC staff and GAP representatives. The NRC technical staff reviewers present were permitted to see brief summaries of the allegations in the possession of GAP. During the meeting, the NRC technical staff attempted to assess the safety significance of the allegations. However, the information made available to the technical staff was lacking in specificity and no conclusions on safety significance could be reached. In order for the NRC technical staff to gain access to more detailed information, arrangements were agreed upon for the NRC technical staff to review records pertaining to the allegations at GAP's offices in Washington, D. C. Included in the agreement was that the protocol for the NRC staff's work at GAP's offices was to protect, to GAP's satisfaction, the identity of the allegeders.

## 2.0 REVIEW APPROACH AND METHODOLOGY

### 2.1 Government Accountability Project's (GAP) Allegation Files

An NRC team was assembled, referred hereinafter as SSAT (Safety Significance Assessment Team) to review GAP records of the interviews with the allegeders (referred by GAP as concerned individuals - CI) and individual allegations that GAP enumerated from the interviews.

The SSAT completed its review of the information made available by GAP in December 1987. This information consisted of audio tapes of some of the interviews conducted by a GAP consultant with the allegeders, the consultant's hand-written text extrapolated from the interview tapes accompanied with supporting information, and allegation data compilations which included a brief description of the concern.

GAP's initial categorization of the allegations listed duplicate concerns under different review disciplines. Because of this, the SSAT initially had to consider approximately 700 allegations. When these duplications were reconciled, there were 576 individually enumerated allegations. Of these 576, approximately 160 allegations were variations of the initial allegation and merely restated some additional facets of the original

allegation such as possible documentation problems, inspection concerns or intimidation and harassment related to or caused by the initial allegation. GAP categorized the allegations into the following sections: safety-related, intimidation and harassment, wrong doing, and non safety-related with 26 discipline subsets and four sub-discipline categories. Table 2.1 presents the categorization and designation of allegations used by GAP.

The GAP consultant's handwritten text was assembled in numbered files which contained reference materials related to the allegations. There were approximately 20 files with varying quantities of text and reference data and two separate files containing 576 individual allegation data sheets. As agreed, at the completion of the review, all the records examined by SSAT remained at GAP's headquarters and the identity of the allegers represented by GAP was kept confidential by SSAT.

## 2.2 Screening and Categorization of Allegations

The initial screening was performed by SSAT members who have comprehensive knowledge in particular areas related to the alleged concerns; mechanical electrical, instrumentation, civil, structural and metallurgical engineering, quality assurance and control, nuclear plant construction and operations and the NRC inspector program. These technical disciplines were supplemented by other staff members experienced in project management and engineering to extract the safety-related concerns from the harassment and intimidation, wrong doing, and management issues.

SSAT members reviewed each allegation, its associated interview text and reference material file in their area of expertise. Screening also included listening to allegor interview audio tapes to verify the accuracy of the written text GAP's consultant had extrapolated from them.

Generally, the SSAT's initial screening determined that a large majority of the allegations lacked specificity in identifying a particular component, system or location about which the allegor was concerned. To assure that all aspects of GAP identified allegations were reviewed and evaluated, the

SSAT forwarded to the NRC's Office of Investigation all allegations that they reviewed which were categorized as harassment and intimidation or wrong doing.

### 2.3 Compilation of Allegation Data

The results of the SSAT review and initial screening were documented and identified by GAP allegation number. Examination of the concerns conveyed by the allegations by SSAT showed that the common characteristics permitted grouping and prioritization. The grouping process would enable efficient use of SSAT resources to conduct physical inspections, and the prioritization process would enable assessments of wider implications such as determination of root causes and generic implications as well as probing for evidence of quality assurance breakdown. Therefore, SSAT assembled the concerns conveyed by the allegations into groups with common characteristics. The SSAT's generated information was entered into a computerized data base and each GAP allegation was assigned to one of the following allegation categories: Mechanical and Piping; Electrical, Civil/Structural; Quality Assurance and Control (QA/QC); Harassment and Intimidation; Wrong Doing; NPC and Management issues. Each category had several subsets that were used to specify more closely, issues that each allegation appeared to be addressing. Table 2-2 presents SSAT allegation groups.

### 2.4 Selection of Allegations for Site Inspection

From approximately 700 original allegations found in GAP's files, the SSAT sorted them out to delete repeated allegations and those considered to be non safety-related and harassment and intimidation and wrongdoing. As indicated from the results of this sort presented below, the SSAT determined that out of the 700 original GAP's allegations, approximately only 226 remained as possible candidates for onsite inspection at STP. These 226 allegations were considered by SSAT to be technically-oriented and possibly safety-related.

SSAT classified approximately 250 GAP's allegations as harassment and intimidation and wrongdoing and they were referred to NRC's Office of Investigations by the SSAT for their review.

Approximately 100 of the GAP's allegations were found by the SSAT not to be of significant safety concern. These were generally allegations related to the cost of the construction effort, industrial safety, personnel practices or management activities. These non safety-related allegations are considered closed and there is no need for further review.

◦	GAP's original allegations	.....	700	
◦	Repeated allegation			
	Identification Numbers.....	<u>124</u>		584
◦	Harassment and Intimidation, and wrongdoing allegations identified by GAP and SSAT	.....	<u>234</u>	350
◦	Non safety-related allegations identified by GAP and SSAT	.....	<u>138</u>	212
◦	Available allegations for onsite inspection selection	.....	<u>212</u>	

This sort also identified that out of the 576 allegations enumerated by GAP, only 16 could be sited to a specific location, system or component. The remaining 560 allegations referred only in general terms to items of concern. It should be noted that the allegers have not yet been interviewed by SSAT at this time to obtain specific information in support of their allegations. However, as indicated in Section 2.6, the additional information provided by the allegers via telephone conversations to SSAT continued to be deficient on specifics with a few exceptions.

had?

Notwithstanding the lack of specificity, the SSAT ~~was directed to~~ performed an onsite inspection so a determination could be made concerning the safety significance of the allegations.

From the 226 allegations, the SSAT selected for onsite inspection at the STP facility, 10 primary areas, each identified by a given allegation (referred hereinafter as the primary allegation). In addition to the primary allegations, 61 additional secondary allegations were selected which conveyed similar concerns as the primary allegations. The 71 allegations selected by SSAT represent approximately 31% of the total number of allegations that the SSAT considered as the only possible candidates for inspection. The selected allegations are representative of the technical concerns conveyed by the allegers represented by GAP, and bounded the 226 allegations. The selection was based on the safety significance, generic implications, specificity to a particular plant component, system or structure, and to provide a multidiscipline overview of STP's Quality Assurance Program implementation and effectiveness. Furthermore, the 16 allegations including specific information were included as part of the 71 allegations selected for inspection.

The selected allegations encompassed the following areas: Piping and mechanical components; valves; heating, ventilation and air conditioning (HVAC); fasteners; welding; electrical cable and instrumentation; civil and structural; coatings; quality assurance and control; and polar crane and orbital bridge.

## 2.5 Inspection Plan

The SSAT members selected for the onsite inspection were the same individuals that performed the review, evaluation, and screening of the GAP's allegations. Given the general non-specific nature of the allegations, the use of these experienced reviewers as inspection team members greatly facilitated the effort.

In view of the lack of specificity included in many of the selected allegation areas, the SSAT approach for resolution of the allegations considered a broad, generic look at the areas of concern.

Detailed inspection plans were prepared by the SSAT including inspector guidance to assure consistency in the inspection process. The plans included provisions for combining other related or unrelated issues with the selected GAP allegations in the event that was needed to ensure that the substance of the allegations did not reveal the identity of those alleged that would be requesting confidentiality. The plans focused on Unit 1 of STP except for a few cases when the allegations also made specific reference to construction irregularities in Unit 2. The SSAT inspection plans are included in Appendix B.

*Why didn't you allow allegations into U-1 plan?*

In addition to following the inspection plan, the SSAT reviewed other sources of information such as NRC Region IV inspection reports pertaining to the resolution of South Texas Project facility allegations; NRR inspections data and safety evaluation reports; HL&P's SAFETEAM records, and other documentation to determine whether they provide any additional information related to an alleged concern.

The SSAT conducted the onsite inspection during the week of January 18-22, 1988. Also it involved Region IV and resident inspector personnel who provided background information related to previous inspection activities. During the site inspection, the SSAT inspected those areas related to the selected 71 allegations and focused their efforts on the safety-significance of the technical concerns in those areas.

## 2.6 Interviews with Allegers

Because of the general lack of specificity and detail included in GAP's allegation files, the SSAT made arrangements with GAP to conduct interviews with the alleged so specific information could be obtained for the allegations selected for inspection. The SSAT provided for GAP the selected allegations to allow GAP to identify and contact the appropriate

allegers for interviews. GAP identified 19 allegers involved with the selected allegations, however, only 10 allegers could be reached. According to GAP, these allegers were the ones who have the most significant concerns. They were interviewed via telephone by the SSAT with GAP included to provide guidance to the allegers and conversations were transcribed. Also, SSAT conducted face to face interviews with two of the 10 allegers previously interviewed by telephone without GAP being involved and conversations were not recorded. The interviews were conducted prior to and during the onsite inspection at the STP facility.

CA advised the allegers interviewed not to reveal their identity to SSAT. However, two of the allegers did not follow this advice and revealed their identities to SSAT. No confidentiality agreements with the allegers were requested. Only one of the allegers interviewed expressed concern about its identity being revealed if questions were asked to HL&P and its consultants concerning the information provided to SSAT. The SSAT made adjustments to the inspection plan to prevent the identity of this alieger from being known.

Although GAP's cooperativeness facilitated the interviews with the allegers, the additional information provided to SSAT continued to be deficient on specifics with a few exceptions. The limited amount of specificity obtained from these interviews only required minor adjustments to established inspection plans.

## 2.7 Communications with Houston Lighting and Power (HL&P)

The SSAT conducted an entrance meeting with representatives of Houston Lighting and Power and their engineering and construction consultants on January 18, 1988. HL&P introduced their SSAT counterparts and assured that all of the necessary materials, site accesses and personnel would be available for the SSAT. During the inspection, HL&P and its consultants promptly accomodated the SSAT's requests which greatly facilitated the inspection effort.



Table 2.1 GAP allegation categorization and designation

SECTION	DISCIPLINE	CATEGORY	ALLEGATION	RELATED ALLEGATIONS
I - Safety-Related	A- Piping/Mechanical/ Instrumentation	a. Hardware	0001 -9999**	.1, .2, .3, etc.
II - Intimidation/ Harrasment	B- Electrical			
	C- Civil/Structural			
III - Wrongdoing	D- Heating, Ventilation and Air Conditioning	b. Documentation/ Drawings		
	E- Engineering/Design	c. Inspection/ Testing		
IV - Non Safety-Related	F- Procurement/Purchasing	d. Other		
	G- Equipment Qualification			
	H- Fire Protection			
	I- Quality Assurance/ Quality Control/ N-5/Systems Completion			
	J- Welding			
	K- Safety/security			
	L- Health Physics			
	M- Seismic & Environmental			
	N- Generic (all disciplines)			
	O- Personnel			
	P- Management			
	Q- Training			
	R- NRC			
	S- Safeteam			
	T- EBASCO			
	U- Houston Lighting and Power			
V- System Complete & Turnover				
W- Authorized Nuclear Inspection				
X- Qualification of Personnel				
Y- Bechtel				
Z- Document Control				

EXAMPLES

I A a - 0001= Safety related/Piping/hardware specific allegation number

I A b - 0001.1 (same), subset documentation

\*\*Allegations numbers are cross-referenced to actual GAP allegation number.

Table 2.2 SSAT allegation groups

A. MECHANICAL AND PIPING

- |    |   |                                     |   |
|----|---|-------------------------------------|---|
| 1. | PIPING  | A. Pipe<br>B. Hydro                 | C. Configuration<br>D. Chloride Contamination |
| 2. | VALVES  | A. Limitorque<br>B. Installation    | C. Missing                                    |
| 3. | MATERIALS   | A. Traceability<br>B. Compatability |   |
| 4. | HEATING,<br>VENTLATION<br>AND AIR<br>CONDITIONING<br>(HVAC) | A. Procurement<br>B. Installation   | C. Fabrication<br>D. Testing                  |
| 5. | SESIMIC<br>QUALIFICATION                                    |                                     |   |
| 6. | FASTENERS   | A. Counterfeit/Foreign              |   |
| 7. | WELDING   | A. Weld Rod<br>B. Qualifications    | C. Welder ID<br>D. Traceability               |
| 0. | OTHER   |                                     |   |

B. ELECTRICAL

- |    |                             |            |  |
|----|-----------------------------|------------|--|
| 1. | SPLICES                     | A. Raychem |  |
| 2. | CABLE AND CONDUIT           |            |  |
| 3. | INSTRUMENTATION             |            |  |
| 4. | ENVIRONMENTAL QUALIFICATION |            |  |
| 0. | OTHER                       |            |  |

C. CIVIL/STRUCTURAL

- |    |          |
|----|----------|
| 1. | CONCRETE |
| 2. | SOILS    |
| 3. | COATINGS |
| 0. | OTHER    |

Table 2.2 (continued)

D. QUALITY ASSURANCE/  
QUALITY CONTROL QA/QC

1. DESIGN CONTROL
2. PROCUREMENT
3. DOCUMENT CONTROL
4. QC INSPECTION
  - A. Inspection Records
  - B. Travellers
  - C. Hold Point
  - D. Authorized Nuclear Inspector
  - E. Non-Conformance Reports (NCRs)
5. ASBUILT vs DESIGN
6. SYSTEM TURNOVER
7. FSAR/SPECIFICATIONS
8. PROCEDURES
0. OTHER

E. HARRASSMENT & INTIMIDATION (safety-related issues only)

F. WRONG DOING (safety-related issues only)

G. NRC

H. MANAGEMENT

1. HOUSTON LIGHTING AND POWER (HL&P)
2. BECHTEL
3. EBASCO
4. INTERMECH
5. PERSONNEL PRACTICES
6. TRAINING
7. SAFETEAM
0. OTHER

O. OTHER

### 3. SUMMARY AND CONCLUSIONS

#### 3.1 Inspection Findings

The SSAT found that several of the allegations selected for inspection at the STF facility were substantiated at some point in the construction history. Evidence of this was apparent from the documentation of engineering, inspection and special reviews within those areas examined by the SSAT. However, the SSAT found that STF's Quality Assurance Program implementation was successful in identifying the concerns and applying appropriate corrective actions.

The SSAT determined as a result of their inspection efforts, including interviews conducted with available allegeders, that the allegations examined could be placed in the following categories:

	<u>Total</u>
° Allegations Substantiated	
- Deficiency corrected by HL&P	11
- Deficiency evaluated and determined to be acceptable "as-is" by HL&P	2
- Deficiency found to be non safety-related by SSAT	5
- Deficiency found by SSAT	3
	<i>safety implications or not?</i>
° Allegations Unsubstantiated	
- No deficiencies found by SSAT	21
- Lack of specificity, and generic review of area of concern performed by SSAT found no problems	29
° Total number of allegations for selected onsite inspections	<hr/> 71

*What's this mean?*

Table 3.1 of this report gives examples of the type of allegations in each of the above categories.

### 3.1.1 Allegations Inspected

The characterization of the 71 allegations selected for inspection at the STP facility are presented in Table 3.2, and includes a brief summary of the statements obtained by SSAT from GAP's files, as augmented by information obtained by SSAT from the alleged interviews. Also, this table shows other characteristics pertaining to the area of concern that were inspected by SSAT, and the number of duplicated and other related allegations per category which have been closed as a result of SSAT inspection conducted at STP site.

### 3.1.2 Balance of Allegations

As a result of the broad, generic and programmatic look given to the areas of concern by the SSAT to compensate for the lack of specificity conveyed by the allegations, many other hardware and QA/QC related characteristics were inspected by SSAT. These are discussed through Section 5.1 of this report.

As soon as the inspection results of the selected allegations became available, the SSAT examined the remaining allegations to determine which ones needed further consideration, or have been satisfactorily resolved based on the findings of the inspection.

Some of the remaining allegations were dispositioned by SSAT because they were found to be duplicate to the allegations selected for inspection. Other remaining related allegations were dispositioned because the concerns were enveloped by the SSAT inspection. Table 3.2 identifies the other characteristics inspected by SSAT, as well as the number of duplicate and related allegations.

Many of the remaining duplicate allegations included concerns raised by the allegers that the deficiency conveyed by the primary GAP allegation was also not addressed on non-conformance reports. These issues were addressed by the SSAT where enough specificity was provided as to the system, component or structure that had the alleged deficiency. The SSAT determined that many issues reviewed did not have non-conformance reports generated for the following reasons: the problem or deficiency was noted during in-process construction activities where final quality inspections were not yet called for; the item was being modified or changed as required by engineering and described on a field change document and; the item was non-safety related for which non-conformance reports are not written, and if the item was found to be deficient, it was addressed on engineering field change documents and/or inspection reports.

As part of this examination, the SSAT used NRC Region IV inspection reports and HL&P's SAFETEAM investigation reports that were determined to provide additional insight concerning the allegations under review by SSAT. These reports were evaluated by SSAT and found that <sup>they</sup> addressed certain identical allegations that they were currently being pursued by SSAT. It was determined that those allegations of interest to SSAT were appropriately dispositioned in these reports. The contents of these reports after being evaluated by SSAT were used to support SSAT findings and provided the basis for dispositioning some of the balance of allegations where applicable.

The SSAT's results of this examination are presented below.

- Available allegations for  
onsite inspection selection .....212
- Allegations selected for  
inspection .....71 14i

(From previous page).....	141	
° Balance of Allegations		
- Duplicate.....	71	
- Related.....	<u>45</u>	
Sub Total.....	116	<u>116</u>
° Total Remaining Allegations.....		<u>30</u>

Of the 212 allegations identified in Section 2.4 as possible candidates for inspection, 71 were inspected at the site and 116 were dispositioned for the reasons given above. The remaining 30 allegations lack specificity to determine whether they can be enveloped by the review performed by SSAT. However, SSAT considers these allegations of lesser importance and have no immediate safety significance. The SSAT considers them closed until such a time that specific information will justify further NRC review.

### 3.2 Overall Review Effort

The SSAT consisted of thirteen members of the NRC staff. They performed the initial screening of allegations at GAP's offices in Washington, D.C., and conducted the onsite inspection of selected allegations at STP. This inspection also involved NRC Region IV and resident inspector personnel who provided background information related to previous inspection activities and substantive support to the SSAT.

Also, the SSAT was assisted by the <sup>M</sup>mechanical engineering branch and <sup>M</sup>material <sup>B</sup>engineering branch of NRC's Office of Nuclear Reactor Regulation (NRR) to confirm the adequacy of analysis pertaining to the installation of NSSS components. Additional <sup>A</sup>assistance was provided by various NRC offices in matters related to congressional and public affairs, allegation management, conducting allegers interviews and investigations, and legal, administrative, editing, word processing and telephone

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conference services support. Moreover, contractor personnel provided support in recording and transcribing SSAT's telephone conversations with the allegeders.

Since November 19, 1987 when the initial assessment of the GAP's allegations commenced until February 29, 1988, approximately 3,335 NRC staff and contractor hours were spent in the review of these allegations. A breakdown of these hours is as follows:

	<u>Staff/Contractor</u> <u>Hours</u>
o NRC SSAT	
- GAP's Headquarters Files Review.....	900-
- STP Site Inspection (1/18-22/88).....	1,010-*
- Evaluation of Balance of Allegations and Preparation of Report.....	1,000-
o Other NRC NRR Staff.....	100-
o NRC Region IV.....	300-
o Reporting Contractor.....	75-
o Total Staff/Contractor Hours.....	<u>3,335-</u>

\* It includes 400 hours of overtime

### 3.3 Overall Assessment and Conclusions

An essential part of the SSAT's inspection effort besides determining the safety significance of any technical issues examined, was also to focus on the QA aspects of each area examined. Table 3.3 shows the 10 CFR Part 50 Appendix B Quality Assurance Criteria that were evaluated in the allegation areas review by SSAT. This focus was to determine if the QA program at STP was effective in identifying, solving, correcting and satisfactorily closing safety significant, technical issues as well as



those of programmatic concerns. The SSAT also measured the effectiveness of the assurance of quality in the responsible line organizations for each area and issue examined. This was done because quality organizations are responsible to see that line organization programs are in place and are being implemented. This is accomplished through a system of audits and surveillances. When problems are identified in a line organization, it is Quality Assurance's responsibility to see that effective corrective actions are implemented and that the resolution of the identified deficiencies are correcting the problem not just the symptoms of the problem.

The SSAT determined that the Quality Assurance (QA) and line organizations involved with the issues examined during the inspection have effectively assured that QA programs at all levels of implementation are in place and that any problems which arise are corrected satisfactorily. Except for a very few isolated instances, the SSAT determined that the engineering, construction, administrative and managerial organizations at STP have been effective in assuring that deficiencies are identified, solved and corrected to preclude repetition.

The SSAT also determined that in many instances, the alleged concerns did exist at one time during construction activities at STP. However, many of these allegations appear to have been made without the knowledge of the procedures for assuring quality that have been in place during construction and are continuing today.

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4. ACTIONS REQUIRED BY HL&P

*Start on New page*

4.1 Raychem splices

As a result of the SSAT inspection in the electrical and instrumentation area of concern, one deficiency was identified by the SSAT: A Raychem cable splice was found in Unit 1 that had not been reinspected for proper installation as required as part of an earlier reinspection program at STP.

*- Has it been fixed?  
Is it safety significant?  
was it an allegation?*

Table 3.2 Characterization of allegations selected for onsite inspection and disposition of balance of allegations

<u>Category No.</u>	<u>Area</u>	<u>Selected Allegations</u>	<u>Characterization of Allegations</u>	<u>Duplicated Allegations</u>	<u>Other Characteristics Inspected</u>	<u>Number of Related Allegations Closed</u>
1	Piping and Mechanical Components	9	Pipe Joints not properly installed; pipe to tank connections inadequate; filter screens in NSSS loop damaged during testing; valves and pumps are inaccessible for maintenance and operation; steam generator installed out-of-plumb; aluminum bronze pipe contains micro-organisms that are detrimental to the equipment in the systems; questionable ASME N-5 documents when a pipe whip restraint was deleted from drawing.	3	Design Control	1
2	Valves	4	20% of valves are installed backwards; 160 Limitorque valves were not properly maintained; valves were installed out of location; remote valve extensions were interfering with conduit and pipe supports.	5	Design Control Valve Installation Valve Maintenance	1 2 1
3	HVAC	10	HVAC welds were not cleaned prior to painting; HVAC ductwork and supports not installed per specifications; material stolen from HVAC components and	5	HVAC Installation Design Control QC Hold Points HVAC Fabrication	1 1 1 ?

*Further's  
able 3.1*

Table 3.2 (continued)

-2-

<u>Category No.</u>	<u>Area</u>	<u>Selected Allegations</u>	<u>Characterization of Allegations</u>	<u>Duplicated Allegations</u>	<u>Other Characteristics Inspected</u>	<u>Related Allegations Closed</u>
			reused elsewhere; HVAC installed too close to other equipment -- seismic tolerances violated; caulking used to seal ductwork not adequate; HVAC welds not in accordance with specifications; Unit 1 HVAC damper never tested -- similar item in Unit 2 required replacement; wrong size angle iron used in HVAC supports; HVAC ductwork signed-off as complete when it was not.			
4	Fasteners	11	Concrete anchor bolts not installed per procedure; fasteners from questionable U.S. companies and foreign countries used in plant; fasteners in plant do not meet specifications;	6	Counterfeit fasteners Fastener Testing Fastener Material Certification	1 1 1
5	Welding	9	Weld rod traceability lost; faulty weld rod used all over; welders not certified; welds do not have welder's I.D.; welds I.D.'s falsified.	3	Welding Process QA Welding Program Weld Documentation	4 1 1

Table 3.2 (continued)

-3-

<u>Category No.</u>	<u>Area</u>	<u>Selected Allegations</u>	<u>Characterization of Allegations</u>	<u>Duplicated Allegations</u>	<u>Other Characteristics Inspected</u>	<u>Related Allegations Closed</u>
6	Electrical and Instrumentation	9	Raychem cable splices do not meet safety standards; nonconformance reports not written for improperly installed cable splices; cable pulled using a come-a-long; flex conduit not installed per requirements; weld splatter found on fr core instrumentation guide tubes; addition radiation protection required for LWPS panel; reactor coolant instrument lines should have 2 valves instead of 1; flow transmitters removed after final inspections.	9		1
7	Civil/Structural	4	Rebars drilled through; crack in basemat of Fuel Handling Building; improper backfill used; backfill did not pass tests.	4		
8	Coatings	1	Coatings on orbital bridge flaking and chipping.	7	Inspector Certification Coating Procedures Surface Preparation Coating Integrity	1 4 1 1
9	Quality Assurance/ Quality Control	10	ASME N-5 reports invalid; inadequate engineering and design; as-built	24	QA Record Traceability Material Compatability System Turnover	2 1 1

Table 3.2 (continued)

<u>Category No.</u>	<u>Area</u>	<u>Selected Allegations</u>	<u>Characterization of Allegations</u>	<u>Duplicated Allegations</u>	<u>Other Characteristics Inspected</u>	<u>Related Allegations Closed</u>
			items do not agree with as-designed configurations; inadequate field document control.		Exit Torque procedures QC Inspection Records Transition Plan Document Control Receipt Inspection Independent Verification Contractor Oversight	1 3 1 1 2 1 1
10	Polar Crane and Orbital Bridge	2	Polar Crane and Orbital Bridge have deficiencies that have not been corrected.	1		
11	Non Safety-Related	2	HVAC diffuser plate was modified for Unit 2; similar item in Unit 1 was not modified; cleanliness barrier violations; worker confidentiality	3	OA Conflict of Interest	1
Totals		<u>71</u>		<u>71</u>		<u>45</u>



Remco

HL&P on its own initiative performed a generic examination of Raychem splices in both Units 1 & 2 to verify that problems similar to the unreinspected Raychem splice in electrical penetration EPA-19 do not exist in the plant.

HL&P has informed SSAT that it has re-examined records pertaining to the Raychem reinspection program. To date, February 16, 1988, HL&P has identified that one other Raychem splice in a Unit 1 reactor containment electrical penetration and six Raychem splices not in containment penetrations have reinspection documentation that is inadequate or missing. As a result, HL&P advised SSAT that they will conduct a 100% review of all Raychem splice reinspection documentation and will physically reinspect any splices shown to have inadequate documentation.

The SSAT has reviewed some of the results of the HL&P re-examinations for Unit 1 and has concurred with the findings. However, prior to ascension from 5% power for Unit 1 and fuel loading for Unit 2, HL&P shall complete all the examinations concerning Raychem splices and corrective actions that were necessary.

#### 4.2 Nuclear Steam Supply System (NSSS) Components

The SSAT sought the assistance of the NRC NRR technical staff to further confirm the acceptability of HL&P's analyses for justifying out-of-plumb (verticality) tolerances of major NSSS components in Unit 1. The NRC NRR staff has met with HL&P and its consultants and concluded that the analyses had satisfactorily resolved the concerns. However, prior to ascension from 5% power for Unit 1, HL&P shall submit a report to NRC documenting the results of the analysis. Further review by NRC NRR staff, if required, will be documented in a separate SER.

## 5. REVIEWS OF ALLEGATION CATEGORIES

### 5.1 Piping and Mechanical Components

#### 5.1.1 Thrust Restraints for Buried Mechanical Joint Pipes

##### 5.1.1.1 Characterization of Allegation

It is alleged that underground yard composite piping made from ductile iron and utilizing mechanical joints had been buried (prior to November 1984) without the required anchorage supports such as tie rods and thrust blocks. An interview with the alleged revealed that approximately six systems were involved, notably the essential cooling water system (ECW) which provides cooling for safety-related components during normal plant operations, after a loss of cooling accident (LCCA), a loss of offsite power (LOOP) event, as well as all other design basis events.

##### 5.1.1.2 Details

The SSAT reviewed all information presented with the allegation and the documentation provided by HL&P during the inspection. These included such items as potential change notices (PCN), engineering correspondence, American National Standards Institute/American Water Works Association (ANSI/AWWA) standards, pipe specifications, twenty-four composite piping drawings, piping and instrumentation diagrams (P&ID), cost estimates for piping excavation and a list of all mechanical joint pipe installed by Brown and Root (B&R) and Babco as of November 1984.

The SSAT reviewed three interoffice memorandums (IOM) written by various site civil/structural engineers and project engineers concerning this issue. In IOM No.31168, dated November 15, 1984, it was stated that, when the South Texas Project was being designed and constructed by Brown & Root (B&R), design of buried mechanical joint pressure pipe was the responsibility of the B&R Piping Group. However, when



Bechtel took over design responsibility for the project, the responsibility was assumed by the STP Plant Design Group. During a field visit in March 1984, Site Civil/Structural personnel noted that mechanical joint pipe was being buried without restraint devices because it was later recognized that restraint devices were not required by the Plant design drawings or any specification. The IOM also stated that mark-up drawings and several design document packages related to the mechanical joint pressure piping were available. These drawings and design documents showed which pipe was installed by B&R, and which pipe was installed by Ebasco prior to September 1984. A review of the design documents and any recommendations to avoid the excavation of pipe was requested in the IOM.

In response to IOM No. 31168, IOM No. 33293 dated November 20, 1984, stated that a review was performed for the submitted documents and it was concluded that thrust restraints must be provided on the installed pipes. The reasoning was that there is no mechanical mechanism to resist the longitudinal thrust forces and thus, without restraints, the joint may easily come apart under internal pressure causing uncontrolled leakage and associated consequences. However, the IOM also stated that according to procedure, the installed pipes should have been hydrotested before backfilling took place and that temporary restraints should have been provided during testing. The memo also stated that often times such temporary restraints are not removed by the contractor and possibly B&R and/or Ebasco may have left them in place. Documentation that such restraints exist, if available, could avoid excavation and installation of restraints.

On March 15, 1985, IOM No. 34161 was issued stating that conceptual designs were developed for the buried thrust restraints at bends of underground pressure pipes with mechanical joints. A list of the bends was prepared from the 24 marked-up plant design drawings and a recommended type of restraint was called out for each bend. There was also an attached cost estimate developed from the conceptual designs. Potential change notice (PCN) addressing the engineering

concerns and construction costs for the pipe restraints described in the IOMs was initiated on March 12, 1985. Attached to the PCN was a list of all mechanical joint pipe installed by B&R and Ebasco as of November 1984 which included six piping systems. The systems and pipe sizes involved were as follows: 6" essential cooling water system (EW), 6" essential cooling pond make-up (EP), 8" fresh water supply (SW), 8" & 6" well water (WW), 4" & 3" potable water (PW) and 8" & 4" service water supply (TW).

The SSAT reviewed the PCN issued on March 12, 1985 to determine what actions were taken by HL&P for the excavation and modification of the buried pipe. The SSAT was also provided with IOM No. 38180 indicating that a design change approval review board (DCAR Board) met on July 8, 1985 and rejected the PCN. The DCAR Board concluded that leakage pipes buried without restraints would not result in serious consequences such as damage to safety-related systems, components or structures. In lieu of the verification and corrective action proposed in the PCN, the DCAR Board determined that area surface monitoring would be adequate. In view of this decision, a checklist and Sketch No. C-635 showing the locations of potential leaks were prepared, for utilization of surface monitoring.

Shortly after the DCAR Board decision was made, some excavations incidentally exposed several mechanical joints with tie rods. HL&P determined that these joints were adequate and subsequently reduced the number of locations to be monitored. Uninspected joint locations remained on the checklist for visual monitoring during the inspection program. To aid in the monitoring, the existing soil over these areas was removed and limestone and crushed rock was put in place over them to allow any leakage which might occur to rise to the surface above the joint for prompt identification and location of the problem. The SSAT also verified that plant design drawings for buried pipe were revised by DCNs to require thrust restraints in future applications.

The SSAT also reviewed the marked-up sketch C-635, composite piping checklist, and several excavation backfill request and determined that the actions being taken for the monitoring of potential leaks were acceptable.

The SSAT reviewed the composite drawings for the affected systems, all DCNs for pipe installed after September 1984, the P&IDs depicting the complete EW system, applicable piping and excavation specifications and a the marked-up sketch C-635. From this review the SSAT determined that the buried lines without thrust restraints were classified as non safety-related. Of note was that, while the EW System is safety-related, the 6" buried line in question was a non safety-related portion and is used for discharging intake strainer backwash to the pond (a non safety-related function). Several DCNs issued during and after September 1984 against the applicable composite drawings were reviewed and found to require the use of tie rods and thrust restraints for future installations. None of the piping or backfill specifications were found to be classified as safety-related.

#### 5.1.1.3 Conclusion

The SSAT determined that this allegation was substantiated in part. While it was found that some buried pipe was installed without thrust restraints, none of the affected lines were safety-related and adequate action was taken on this concern. Potential leakage from these joints was being monitored, and it had been evaluated that possible leakage would not affect safety-related systems, structures or components.

#### 5.1.1.4 Action Required

None

## 5.1.2 Full Flow Filter Screen Failures

### 5.1.2.1 Characterization of Allegation

It is alleged that the Reactor Coolant System (RCS) needs to be inspected after approximately two hundred full flow filter screens disintegrated during hot functional testing of the RCS.

### 5.1.2.2 Details

The SSAT reviewed a detailed Westinghouse report, WCAP-11506, dated June 1, 1987, entitled "Full Flow Filter Recovery and Equipment Assessment." The report stated that after completion of hot functional testing at South Texas Project Unit 1, which spanned 28 days under full flow and operating temperatures, inspection of the full-flow filters installed on the lower core support plate in the reactor vessel revealed that degradation of 57 of the 192 filters had occurred. The filters are used during both cold and hot functional testing to help remove any debris from the primary coolant system. The Unit 1 filters had experienced certain degradations ranging from small tears or holes in the screen material to the complete loss of four filter screens. As a result, the filter debris circulated throughout the primary coolant system and parts of the attached auxiliary systems during testing.

The Westinghouse report discussed the design of the Full Flow Filters, the results of inspections performed on equipment in the primary coolant and certain auxiliary systems, results of metallurgical examinations performed on the filters, and the evaluations of the effects of the unrecovered filter debris on equipment. Additionally, the report contained a safety evaluation justifying operation of the plant with unrecovered filter debris.

The NRC Office of Nuclear Reactor Regulation (NRR) had also reviewed this Westinghouse document in their evaluation of this incident. The results were provided in a Safety Evaluation Report (SER), dated

October 8, 1987, entitled "Full Flow Filter Recovery and Equipment Assessment." The SER provided the results of the NRR staff's review and evaluation of HL&P's activities to address the effects of filter debris on the equipment exposed during the hot functional test and operability of equipment with unrecovered filter debris in the reactor coolant and auxiliary systems. The SER concluded that the results of the plant inspection performed by HL&P indicate no evidence of physical damage which would prevent the safe operation of the plant including the fact that the plant would not be affected even if unrecovered filter debris remains in the system. The NRR staff, concluded that the unrecovered filter debris did not constitute a threat to the safe operation of South Texas Project, Unit 1.

5.1.2.3 Conclusion

The SSAT determined that this allegation was substantiated in part due to the fact that the full flow filters did experience some degradation. However, the number of filter screens which experienced some form of degradation was 57, not 200 as originally alleged. Also, the problem had been fully evaluated by Westinghouse and HL&P. The NRC Office of Nuclear Reactor Regulation had reviewed the results of this evaluation and inspections and concurred that the operability of the unit would not be affected. The SSAT also concurred with these findings.

5.1.2.4 Action Required

None

5.1.3 Pipe To Tank Connections

#### 5.1.3.1 Characterization of Allegation

It is alleged that two-inch pipe nozzles require reinforcements at tank connections. This allegation concerns the situation where no reinforcements were provided at nozzles where five two-inch pipes were connected to five separate tanks.

#### 5.1.3.2 Details

The SSAT examined all of the above mentioned two-inch pipe nozzle connections in Rooms #057, #059, #059B, #061, and #071 of the Mechanical Auxiliary Building, South Texas Project, Unit 1. The tanks involved were the Waste Evaporator Condensate Tank, the Laundry/Hot Shower Tank 1A, the LWPS (Liquid Waste Process System) Monitor Tank 1A, the Floor Drain Tank 1A, and the Waste Holdup Tank 1A. These tanks were listed by HL&P as non safety-related components. The SSAT inspected each of the nozzle connections and found each of the lines to be adequately supported and the nozzle connections appeared to be adequately welded.

The SSAT also performed a detailed review of HL&P's design calculations for the nozzle connections which included the specifications describing the technical requirements applicable to the design, fabrication, inspection, and installation of the tanks. Specification 5R019NS0014, Rev. 2, dated April 28, 1987, entitled Specification for Field-Erected Stainless Steel Tanks, was applicable to the Floor Drain Tank 1A while the other tanks were covered under Specification 70249NS017-D, Rev. E., dated May 9, 1983, entitled Specification for Shop Fabricated Atmospheric Tanks.

The SSAT also reviewed the design drawings of the as-built piping configurations as well as their corresponding mathematical models used for computer analyses. For the proposed simple static analyses, the models were found to be adequate representation of the field

configurations. In all the cases reviewed, the SSAT determined that the stresses calculated at the nozzles were well within the allowables required by the Specifications.

It should be noted that this allegation had been covered under two independent investigations. One by the licensor's SAFETEAM (Concern No. 11227), whereas the other by MPC Region IV (IR-87-30). Both investigations concluded that the nozzle connections had sufficient strength without reinforcement.

#### 5.1.3.3 Conclusion

The SSAT determined that this allegation regarding lack of reinforcements at 2" pipe nozzle connections to the tanks was not substantiated. The stress analysis of the 2" pipes indicated that the nozzle stresses were well within the allowables. In addition, the five tanks which were involved in the allegation are non safety-related.

#### 5.1.3.4 Actions Required

None

#### 5.1.4 Steam Generator

##### 5.1.4.1 Characterization of Allegation

It is alleged that steam generator (S.G.) No. 1-D was installed out of plumb such that the steam outlet nozzle is 11 to 13 inches from its required position. This would require piping and support modifications which could affect the original load and stress analysis for those components.

#### 5.1.4.2 Details

The SSAT requested all information on the steam generator issues in order to determine if the steam generator was not installed correctly.

The SSAT reviewed Nonconformance Report (NCR) No. BN-00035, dated March 2, 1983, for steam generator-1-D. The NCR description stated that steam generator 1-D (or No. 4) had been determined by optical survey to be out of plumb approximately 0.157 inches per foot, or approximately 0.75 degrees. NCR BN-00035 was dispositioned "use-as-is" since the existing verticality of steam generator No. 1-D (4) had been evaluated as acceptable by Westinghouse as stated in Letter No. ST-WY-YS-00023 dated March 7, 1983. The disposition also stated that the additional questions raised by Bechtel Engineering in Letter No. ST-YS-WY-00030, dated March 14, 1983, were satisfactorily answered and supplementation of Westinghouse's rationale was made available in Westinghouse Letter No. ST-WY-YS-00026 dated March 4, 1983.

The SSAT reviewed Westinghouse Letter No. SY-WY-YS-00022 dated March 7, 1983, entitled "S.G. #1, #2, #3 and #4 plumbness." The letter stated that, based on refinement survey data received from Bechtel Engineering, Westinghouse accepted the verticality (plumbness) of S.G. Nos. 2 and 3 since the plumbness for these were within the recommended tolerance of 0.5 degrees, maximum. However, Westinghouse indicated that S.G. Nos. 1 and 4 were outside of the recommended tolerance and that further review was required for their acceptability.

The SSAT also reviewed Westinghouse Letter No. SY-WY-YS-00023, dated March 7, 1983, entitled "Steam Generator #1 and #4 Plumbness". The letter stated that Westinghouse design engineers have reviewed the refined survey data for S.G. Nos. 1 and 4 and made an evaluation for possible effects on performance characteristics, system analysis, structural and design analysis, seismic analysis, and piping analysis. Based on these, Westinghouse recommended that Bechtel Engineering accept the present location of the steam generators.



On March 14, 1983 Bechtel Energy Corporation (BEC) issued Letter No. ST-YS-WY-00030 in response to the Westinghouse evaluation. The letter requested further clarification of several questions that resulted during the BEC review of the Westinghouse letter. These questions raised concerns over the potential effects on stress in the S.G. tubes and tubesheet, design assumptions in the ASME Design Report, and the level indication components. On March 14, 1983, Westinghouse responded to these items in Letter No. ST-WY-YS-00026 and satisfactorily addressed the BEC concerns.

In addition to these letters, the SSAT reviewed the Westinghouse Mechanical Service Manual Vol. I, Section IV, Paragraph 11, dated April 19, 1978 that was utilized for the final alignment of S.G. No. 4 (1-D), the construction operation traveler No. 35-1197 dated August 8, 1979 which was utilized for final S.G. alignment acceptance by QA/QC, the S.G. Manufacturers Data Report, dated June 15, 1982, the Brown & Root (B&R) composite piping drawings No. 5C-15-1D-5016 and 5035, and a letter discussing the plumbness of the remaining three steam generators Nos. 1, 2, and 3 (Westinghouse Letter No. ST-WY-YS-00027).

The SSAT questioned the effect that the out-of-plumbness condition of S.G. #1 and #4 had on other components in the Nuclear Steam Supply System (NSSS) Loop. STP staff presented to the SSAT a report entitled "Status of NSSS Related NonConformance Reports," dated August 8, 1983, provided to Houston Lighting and Power Company (HL&P) by Bechtel Energy Corporation. The report stated that, after identification of the S.G. anomalies, a survey and review of the as-installed condition of all NSSS equipment in Units 1 was undertaken. The equipment found to be nonconforming was documented in the report along with the actions necessary to resolve the condition. The following summarizes the conditions noted in the report.

1. S.G. Upper and Lower Lateral Restraints

The generators are displaced by varying amounts relative to the upper and lower lateral restraints, due to the inclination of the steam generators. As a result, nonconforming reports (NCRs) were issued to document the problem.

Westinghouse reviewed the nonconforming condition and stated that the out-of-plumbness was not severe and only minor modifications would be necessary to ensure an adequate support system.

After the modifications were implemented, Westinghouse issued letter No. ST-WN-YR-1468 dated February 12, 1985, stating that a review was performed for the applicable NCRs and as-built measurement information for the lateral supports and determined that the supports were acceptable as installed.

2. Steam Generator (SG)/Reactor Coolant Pump (RCP) Vertical Supports

Detailed surveys were performed that indicated the following items associated with the SG/RCP vertical support columns were misaligned:

- a. Column base plates are rotated with respect to the anchor bolt pattern.
- b. Columns exhibit lack of parallelism with respect to each other.
- c. Columns do not exhibit correct inclination towards the reactor.
- d. Columns have transverse inclination with respect to the reactor.
- e. Columns are rotated with respect to the bases and S.G. adapters.
- f. Equipment columns are eccentric to slab support columns in excess of allowable tolerances.

As a result, NCRs were issued and Westinghouse performed an analysis which indicated that the concerns associated with items (a) through (e) above were not significant from a stress analysis or operability standpoint. It was also stated that the concerns associated with the eccentricity of the columns would be resolved by shifting the equipment support base plates to meet the Bechtel tolerance requirements. In those cases where the required tolerances could not be met by shifting the base plates, it was stated that analyses would be performed to ensure that the load limits on both the structural and equipment supports were not exceeded.

This issue was also discussed in the Westinghouse correspondence dated February 12, 1985 and found to be acceptable as installed.

3. Reactor Coolant Pump

Surveys were taken that indicated the reactor coolant pumps (RCPs) deviate from the design cold position by small amounts.

Westinghouse stated that design tolerances are not specified for the RCP centerline displacements and that proper fit-up is assumed to occur by the reactor coolant pipe cold leg fit-up to the pump discharge nozzles. Also, an as-built stress analysis was performed which verified the acceptability of the system.

Based on the above information, there were no NCRs issued on this item.

4. Steam Generator Piping

Since the steam generator nozzles were displaced laterally by of the lean of the steam generators, some modifications in the piping attached to the steam generator was necessary.

Detailed surveys were taken to determine the required layout for the main steam, feedwater, and auxiliary feedwater lines. NCRs were issued for those lines that did not fit up properly with their respective nozzles. Affected piping was modified in the field and in the shop as necessary to provide proper fit-up.

#### F. Reactor Vessel

Surveys taken on the reactor vessel indicated that the reactor vessel core support ledge was unlevel by an amount greater than the allowed tolerances. The surveys indicated that the slope exceeded the Westinghouse acceptance criteria as restated in the Brown & Root Quality Construction Procedure #A040K PMCP-10.

The tolerance requirements specified by Westinghouse were identical to those specified for other Westinghouse reactors. The tolerance requirements for the ledge ensured that the core barrel retained its verticality by a specified amount, thus facilitating linearity and proper fit-up of all reactor components.

Additional optical surveys were taken to verify the slope of the core support ledge. After reviewing this data, the preliminary evaluation indicated that two separate but related concerns existed. First, there apparently was a tilt of the vessel that may have been associated with the differential settlement of the Reactor Containment Building (RCB) basemat. The second concern was associated with the waviness of the core support ledge which may exceed the Westinghouse flatness criteria.

On October 14, 1983 Westinghouse addressed the two concerns via correspondence No. ST-WN-YB-629 entitled "Evaluation of Reactor Vessel Tilt and Waviness." The correspondence stated in part, that Westinghouse has evaluated the reported conditions and concluded that out-of-levelness condition of the reactor vessel support ledge and mating surface does not constitute a safety hazard and that the

plant may operate without repair. Westinghouse also stated that the reactor vessel tilt results in no significant impact on the reactor's operation, reactor vessel nozzle loads or piping/support loads.

HL&P has been monitoring the differential settlement of all vital structures from the beginning of construction in accordance with the FSAR commitments. The SSAT reviewed the differential settlement data for the reactor containment building and noted that it has remained within the design tolerances. In addition the SSAT sought the assistance of the NRC NRR technical staff to further confirm the acceptability of HL&P's analyses for justifying out-of-plumb (verticality) condition of the steam generators and the other out-of-tolerance conditions noted with major NSSS components in Unit 1.

#### 5.1.4.3 Conclusions

The SSAT determined that this allegation was substantiated in part. While the condition relating to the verticality of steam generator 1-D was found to exist, the condition was analyzed and evaluated to be acceptable, documented properly in a nonconformance report, and satisfactorily dispositioned.

The NRC NRR staff has met with HL&P and its consultants and concluded that the analyses had satisfactorily resolved the concerns.

#### 5.1.4.4 Action Required

Prior to ascension from 5% power for Unit 1, HL&P shall submit a report to NRC documenting the results of the analysis. Further review by NRC NRR staff, if required, will be documented in separate SER.

5.1.5 Reactor Coolant System Pipe Whip Restraint

5.1.5.1 Characterization of Allegation

It is alleged that pipe whip restraint No. RC1125-R1 was deleted from the design drawing via a field change request (FCR) in April 1987. This restraint has three Class 1 large bore feedwater pipe supports attached to it. The restraint is located in the intercorridor of the reactor containment building, Unit 1, Room #201. An N-5 Code Data Report was generated at the same time that the FCR was written. This makes the N-5 code data report information and traceability of the attached pipe supports questionable.

5.1.5.2 Details

The SSAT reviewed the reactor coolant pipe whip restraint Design Drawing No. RC-1125-R1 and all associated design documentation for the large bore pipe supports that have remained attached to the pipe whip restraint structure. The large bore pipe support design drawings reviewed were FW-9012-HLS011, Revision 1, and RC-9125-HL5007, Revision 4. The SSAT performed a field walkdown to assure that the subject supports were the only two large bore attachments to the pipe whip restraint. The SSAT also performed a limited as-built configuration inspection of the large bore supports to verify items such as utilization of correct material, support location and orientation, load settings, heat numbers, and material traceability. Each of these areas was found to be acceptable. In addition, this information coincided fully with the documentation provided in the applicable N-5 Code Data Reports reviewed by the SSAT.

The SSAT also reviewed the calculations for the large bore pipe supports and the procedures governing the design coordination process in which pipe support designs that are to be attached to civil/structural restraints are forwarded to the Civil/Structural Department (C/S) for

review. The SSAT reviewed two support interface load sheets for pipe supports No. FW-9012-HL5011 and RC-9125-HL5007 and procedure No. PED-027 entitled, "Civil/Structural (C/S) Directive for the Review of Pipe Support Drawings." Section 3.1 of the procedure states in part, that pipe support drawings are to be reviewed by the C/S to assure that the structural elements, such as beams, columns, slabs, and walls, are properly loaded. Support interface load sheets are to be submitted to C/S upon completion of engineering design of the support. A review by C/S is not a "hold point" for the initial issuance of support drawings. If any corrective action is required by C/S, it is indicated on the pipe support drawing returned to the pipe support group by memorandum to be incorporated by the pipe support group in the next revision of the drawing. The SSAT found that these procedures were adequate.

The SSAT reviewed Calculation No. CC-5944, File No. C-37, Revision 7. Information on the calculation cover sheet indicated that the calculation for pipe whip restraint No. RC 1125-R1 had been deleted because the energy absorbing material (EAM) section of the pipe restraint was removed. However, there is a possibility for it to be reactivated in the future. It also stated that portions of the restraint that were installed are being used to as pipe supports structures. However, due to the magnitude of the design pipe whip restraint loads compared to the pipe support loads, no analysis needs to be performed. Based on these facts, this calculation was prepared as a reference only, and should the pipe whip restraint be reactivated, a consistency check of the reference drawings, specifications, and other applicable data must be performed at that time.

While reviewing the design drawing for the pipe whip restraint, the SSAT noted "Note 7" which stated that; the pipe whip restraints (PWR) defined on the drawing were not required based on the revised analyses, the PWR support structures which are already erected may

be left in place provided that completion of the structural erection and successful acceptance inspection of the completed work is documented by the constructor through established procedures, and structures which are partially erected or questionable because of uncertain completion, or not documented as completed and inspected, shall be removed.

However, the SSAT also noted a revision to the drawing that added Note 5 which stated that no additional attachments are to be made to this (PWR) restraint. The SSAT informed HL&P that this note could be misinterpreted by other engineering disciplines and should be removed or revised to restrict attachments unless approved by Civil/Structural Engineering. Prior to the conclusion of the inspection, the Civil/Structural Department reviewed all design drawings for Units 1 and 2. No other notes of this type were found, and the above note was corrected which was verified by the SSAT.

#### 5.1.5.3 Conclusion

The SSAT determined that this allegation was not substantiated. The design documentation that was developed to remove the structure as a pipe whip restraint was adequate as well as the design documents and code data reports for the attached feedwater pipe supports.

#### 5.1.5.4 Action Required

None

#### 5.1.6 Aluminum-Bronze Piping

##### 5.1.6.1 Characterization of Allegation

It is alleged that the design of the Essential Cooling Water (ECW) system is inadequate. Specifically, the allegor is concerned that



the aluminum-bronze pipe used in the ECW system does not have adequate wall thickness to compensate for metal loss due to microbiologically induced corrosion (MIC) over the life of the plant, and that later in plant life the piping could fail due to settlement or a seismic event. The allegor is further concerned that this pipe has been subjected to MIC for many years prior to the ECW system being placed in service. The allegor is also concerned that corrosion debris could enter ECW pumps and other system components, thereby rendering the ECW system incapable of performing its safety function.

#### 5.1.6.2 Details

MIC has been and continues to be addressed on a generic basis by the NRC staff. IE Information Notice No. 85-30, "Microbiologically Induced Corrosion of Containment Service Water System," dated April 19, 1985 addresses the subject of MIC. In this notice, the NRC staff acknowledges the potential for bacterial growth under almost any conditions, and describes some general methods for inhibiting MIC.

Some of the methods for inhibiting MIC discussed in the notice include the use of water chemical treatment, use of cathodic protection systems, and procedures to ensure that systems are not subject to low flow rates or stagnant conditions which favor biofouling and concentration cell corrosion.

The SSAT has reviewed the STP ECW system design and operation to determine if the recommendations contained in the notice are being implemented. The following is a summary of findings by the SSAT:

- ° STP has implemented procedures which call for treating the ECW operating loops (there are 3 ECW loops per unit - 2 are generally in service) with injections of sodium hypochlorite and sodium bromide three times a day. This combination of chemicals has been shown to be very effective in preventing biofouling at STP.

- ° ECW loops which are not in operation are operated for short periods on a weekly basis to preclude stagnation and possible biological growth.
- ° ECW loops which are to be shut down for more than 7 days are treated with sodium hypochlorite and sodium bromide prior to shutting down.
- ° The ECW system is a partially closed loop system. Water is taken from the Essential Cooling Reservoir (ECR), is pumped through the ECW operating loops, and is discharged back to the ECR. Heat picked up from ECW equipment is dissipated to the atmosphere. Make up water to compensate for evaporation and bleed off to maintain water quality is added as required. With this design, chemical water treatment introduced into the ECW operating loops every day eventually is discharged into the ECR, resulting in a residual of chemicals being maintained in the ECR. Thus, the source of water for the ECW loops is also protected against biological fouling.

Based on the above, the SSAT has concluded that the licensee has implemented the recommendations of IE Information Notice No. 85-30 with respect to inhibiting MIC.

In addition to the measures for inhibiting MIC described above, the design of the ECW system is such that there are numerous places where the system can be inspected for the presence of biological fouling. Some of these places are discussed below.

- ° The Component Cooling Water (CCW) heat exchanger water boxes are connected to the 36" pipe coming directly from the ECW pumps. When the water boxes are open, it is possible to inspect the large bore pipe for a distance of approximately

8-10 feet. Also, if necessary, the ECW loops can be drained and the large bore pipe made accessible for inspection for even greater distances.

- ° There is a low flow area next to the tube sheets on the outlet side of heat exchangers. Since biological fouling increases as flow rate decreases, the outlet side of heat exchangers would be the logical place for biological fouling to begin, if it were to occur at all. All heat exchangers in the ECW system are accessible for inspection.
- ° Biological fouling (MIC) tends to block flow in small bore piping. The smallest diameter piping in the ECW system are the tubes in the Emergency Diesel Generator (EDG) fuel oil (FO) heat exchanger. If biological fouling were to occur in small diameter piping (heat exchanger tubes), it would occur first in the EDG FO heat exchanger. This heat exchanger is readily accessible for inspection.

The design of the ECW systems at STP makes it possible to inspect for the presence of biological fouling in large bore pipe, small bore pipe, and in regions of low flow. An indication of biological fouling in any of these areas would serve as an indication that corrective actions would be required. By procedure, STP's chemical engineering personnel are notified whenever any portion of the ECW systems are opened for inspection/maintenance so that the opened portion of the system can be inspected for biological fouling. If any bacteria is found in the ECW systems, HL&P has the capability on site to determine whether or not the bacteria present could cause MIC.

The SSAT has determined that a portion of the underground pipe in the ECW system was physically inspected prior to placing the system

in service. The results of this inspection show that some small bacterial growths were found, but there was no indication of pitting of the pipe as is typical when MIC is present. The amount of bacterial growth found was minimal and would not affect flow in the underground pipe.

In addition, to the chemical water treatment and the physical inspection capability, the ECW system performance can be monitored and used as an indicator of the presence of biological fouling. Reduced flow rates and/or changes in heat transfer through heat exchangers are positive indications that of biological fouling may be occurring. System performance is monitored on a regular basis.

#### 5.1.6.3 Conclusion

The SSAT determined that the allegation was not substantiated. While it is possible for MIC to occur in the ECW system at STP, the SSAT found that the measures taken to inhibit bacteriological fouling are adequate. Should such fouling occur, HL&P has adequate procedures and inspection capability to ensure early detection which would allow corrective actions to be implemented before significant damage is done. Based on the above, the SSAT concludes that using the aluminum-bronze piping in the ECW systems at STP is acceptable.

At the time of this report, the NRC staff is still evaluating the resistance of aluminum-bronze pipe to MIC. There is some evidence that aluminum-bronze pipe is less susceptible to MIC than carbon steel or stainless steel pipe. The NRC staff will continue to review this issue as part of its generic study of MIC. The above SSAT conclusions, however, would only be reinforced should it be shown that aluminum-bronze pipe has a high resistance to MIC.

5.1.6.4 Action Required

None

5.1.7 Equipment Accessibility

5.1.7.1 Characterization of Allegation

It is alleged that the design of STP is inadequate because provisions were not made for accessibility to pumps, motors, valves, gages, and other equipment, for operation, maintenance, and repair. It is also alleged that the STP design is in violation of 10 CFR Part 50, Appendix B, Criterion III with respect to accessibility. Two allegeders identified three concerns of a similar nature regarding the design of STP. An interview was conducted with one of the allegeders, who provided additional information as indicated below, in support of his allegations.

5.1.7.2 Details

Two of the three allegations are concerns raised by the same individual. This allegeder was interviewed by the SSAT. During the interview, the SSAT requested the allegeder to provide specific details with respect to systems, locations, and components, that were inaccessible. The allegeder did not respond directly to the requests for specifics from the SSAT. Instead, the allegeder agreed to show the SSAT its concerns (a stated total of 72).

The second allegeder was not made available for interview by the SSAT. Consequently, no specifics were provided as to system, component, or location.

The individual expressing numerous concerns regarding accessibility was initially identified only by a number, but was subsequently identified by name. During the review of on-site records, the SSAT determined that the same individual had raised numerous identical concerns during plant tours in the latter part of 1986. The records also showed that all of the alleged's concerns had been reviewed and dispositioned by HL&P's SAFETEAM. During the telephone interview of the alleged by the SSAT, the alleged made a reference to reports he had received relative to his concerns. The records reviewed showed that the HL&P's SAFETEAM had corresponded with the alleged regarding the disposition of his concerns. Based on the records at STP and the interview of the alleged, the SSAT then concluded that the concerns raised in the allegation given to GAP are the same concerns the alleged gave to the STP SAFETEAM. Subsequently, the SSAT determined that an independent audit of the STP SAFETEAM's investigations of the alleged's concerns would be more productive than a site tour to revisit these concerns with the alleged.

The SSAT selected a representative sample of the alleged's concerns and independently reviewed HL&P's SAFETEAM's investigation and disposition of these concerns. At the conclusion of the review, the SSAT could find no reason to disagree with the STP SAFETEAM findings.

In addition to the above review, during walkdowns of several systems at STP, the SSAT was looking for specific instances where inaccessibility of components had created a safety concern. At the conclusion of the SSAT inspection at STP, no such conditions had been identified.

#### 5.1.7.3 Conclusions

The SSAT determined that the alleged's concerns are almost all associated with non-safety related systems and components. In the

isolated instances where a safety related component was involved, the SSAT determined that those cases did not impact safe plant operation or shutdown. Based on the above, the SSAT determined that the allegations regarding inaccessibility of pumps, motors valves, gauges, and other equipment were not substantiated with respect to safe plant operation and shutdown.

With respect to the allegation regarding 10 CFR Part 50, Appendix B, Criterion III violations, the SSAT was unable to establish that safety related systems and components were involved. Thus, the SSAT determined that this allegation was also not substantiated.

5.1.7.4 Action Required

None

## 5.2 Valves

### 5.2.1 Valve Installation

#### 5.2.1.1 Characterization of Allegation

It is alleged that incorrect installation of valves has resulted in twenty percent of the valves having the wrong orientation to the system flow (i.e. installed backwards). An interview with the alleged revealed no additional information regarding the location or type of valves.

#### 5.2.1.2 Details

The SSAT reviewed the applicable documents controlling the installation of valves including Standard Site Procedure SSP-10, Rev. 4, 1987, entitled "Installations and Field Fabrication of Piping," and SSP-18, Rev. 4, 1987, entitled "General ASME III Welding Requirements." These documents provide detailed guidelines for valve installation procedure, location, and orientation. Particularly, they require that unless specifically shown differently on the design drawing, valves with the valve orientation markings, such as flow arrows, shall be oriented in the same direction as the flow arrows for the lines shown on the isometric drawings. The SSAT attempted to obtain specific information regarding system, location, and valve types involved from the alleged. However, no such information could be obtained. The only information that the alleged provided was that in an unnamed plant construction progress report, a statement was noted that 20 percent of overall equipment items (pumps, valves, instruments, etc.) had not been completely installed at the time. No specific mention was made by the alleged, however, about the type of installation deficiencies such as mis-orientation of valves. Thus, in view of the lack of specific installations, the SSAT's approach for the resolution of this concern included the performance of a generic review and inspection of valve installations in STP Unit 1.

As stated previously, a review of the controlling documents indicated the existence of detailed procedures for valve installation. The



SSAT then proceeded with the review of the actual records wherein the procedures were implemented. This included QC inspection reports for valve installation for both flanged and welded connections. Two systems were selected for in-depth review, the Chemical Volume and Control System (CVCS) and the Component Cooling Water System (CCWS). QC inspection reports were reviewed for the various types of valves installed in these systems and found to be satisfactory. Also, no non-conformance reports could be identified that were directly related to the alleged backward installation of valves.

The SSAT also reviewed the installation of valves in the auxiliary feedwater system to determine if any of the valves had been installed backwards or had been already replaced because of intergranular stress corrosion cracking (IGSCC). The SSAT determined that quality inspections found that some prefabricated drain valve and pipe assemblies had been installed backwards and were evaluated to be acceptable as-is since the function of those valves was not affected by their orientation. There were no records indicating that valves in this system had been replaced because of IGSCC.

Confirmation of correct valve orientation was further made through an independent plant walkdown by SSAT. Approximately 70 valve installations of various types were inspected. The systems covered were safety injection system, reactor coolant system, chemical volume and control systems, component cooling water system, auxiliary feedwater system and emergency cooling water systems. The SSAT found that, with the exception of gate valves and ball valves, arrow indicators were visible on the valve bodies (e.g., check valves, globe valves, and butterfly valves) and were in agreement with the flow directions shown on the isometric drawings. As for those gate and ball valves inspected, the SSAT concurred with HL&P's assessment that the valve orientations had no significance on system performance.

In addition, SSAT conducted an extensive review of the pre-operational test reports for the Chemical and Volume Control System and the Component Cooling Water System. The primary objective of this review

was to determine if there were any anomalies in the system performance during testing which were attributable to valve mis-orientation and whether this resulted in issuance of non-conformance reports. The review indicated that although some non-conformance reports had been issued, none were a result of valve mis-orientation.

#### 5.2.1.3 Conclusion

The SSAT determined that the allegation regarding backward installation of 20 percent of valves was not substantiated. Based on a telephone interview with the alleged, the SSAT found that the percentage was actually meant to refer to status of the completion for overall plant equipment items or categories instead of valve deficiencies. The SSAT found no evidence that valves were installed backwards at STP, Unit 1.

#### 5.2.1.4 Action Required

None

#### 5.2.2 Valve Maintenance and Reassembly

##### 5.2.2.1 Characterization of Allegation

It is alleged that approximately 160 valves with Limitorque operators did not receive proper maintenance prior to installation. It is also alleged that when valves were removed from systems for reworking, various parts were interchanged during reassembly, the valves were mislocated when reinstalled, and the flanged connections were not properly torqued. In addition, it is alleged that valves were received with vendor applied inorganic zinc coatings that were not adequately cured and were removed from the valve and operator assembly by sandblasting.

#### 5.2.2.2 Details

Since no specific information about systems, locations, and types of alleged valves were available, the SSAT conducted a generic review of the subject matter conveyed by the allegations. The SSAT reviewed Standard Site Procedures SSP-10, Rev. 4, dated 12/23/87, Installation and Field Fabrication of Piping, and SSP-18, Rev. 4, dated 12/31/87, General ASME III Welding Requirements, to verify the requirements and guidelines for pre-installation inspection and installation of valves. The SSAT also reviewed SSP-24, Rev. 2, dated 12/31/87, Disassembly/Reassembly of Safety and Non-Safety-Related Valves, for the detailed guidelines of QC verification of each applicable disassembly and reassembly step.

SSP-48, Rev. 4, dated 11/19/87, Equipment or Component Interchanged, was also reviewed. This procedure provides instructions for permanent plant equipment, components, or material interchange between Unit 1 and Unit 2, or any locations within either Unit, or common facilities that require identical items. The SSAT understood that this procedure applies to equipment, components or materials which are purchased to the same specifications, meets designed equipment qualifications, are physically identical, and have identical performance characteristics, but differ only in name tag identification.

In the review of the above documents, the SSAT found that detailed procedures and guidelines were in place which were able to identify and eliminate all the potential areas of concern stated in the allegations. This procedural review was supplemented by the SSAT review of STP QC inspection reports for an extensive list of valves in the chemical and volume control system and the component cooling water system, as reported in Section 5.2.1. In all cases, either no non-conforming condition was identified, or and for those nonconforming conditions found, corrective actions had been taken and concerns had been satisfactorily resolved. Also as previously stated, the SSAT walkdown of 70 valve installations did not reveal

any discrepancy in the as-built valve configurations or locations, and any interferences with other equipment or any accessibility or other conditions which might be related to the allegation.

In regard to sand blasting of valves, the issue was originated from coating failures of 5000 valves in storage caused largely to the lack of proper coating curing time. While some coatings were recoverable, others were repaired. About 25 valves had to have the coatings reworked at the plant site. For this later instance, nonconformance reports were written and were dispositioned to require sandblasting for removal of the damaged coatings. The valves were required to be properly protected and were disassembled according to the specifications. An NRC inspection had been previously conducted on this item and similar conclusions were drawn to the satisfactory conduct of this evolution.

#### 5.2.2.3 Conclusion

The SSAT determined that the allegations were not substantiated except for the valve coating concern which was substantiated in part. The SSAT found that proper controls were found to exist and were implemented for the disassembly, maintenance, and reinstallation of valves. Although a nonconforming condition had existed with the vendor coating of some valves, the SSAT found the condition to be properly documented and adequate corrective action taken.

#### 5.2.2.4 Action Required

None

#### 5.2.3 Radiation Effects on Control Valve Hose

#### 5.2.3.1 Characterization of Allegation

It is alleged that the rubber hose attached to control valve CV-0381A will degrade if exposed to radiation.

#### 5.2.3.2 Details

The SSAT determined that this concern had been previously brought to the attention of the STP SAFETEAM and independently addressed by inspectors from NRC Region IV. The SSAT reviewed the records applicable to this item and determined that the rubber hose in question has a protective braid which is designed to withstand radiation exposure up to 50 rads per hour. The equipment specification (G-95285), in which covers control valve CV-0381A requires that valves and all of their components be capable of withstanding radiation exposures of 50 rads per hour.

Valve CV-0381A is located in room 31, elevation 10' of the Unit 1 mechanical electrical auxiliary building (MEAB). This area of the MEAB is considered to be a high radiation area with exposure rates greater than 100 millirads/hour. However, the estimated exposure rate in room 31 is 1.9 rads per hour. This exposure rate was determined from Bechtel calculation No. NC5028, Revision 0. The valve and its components have been designed to accommodate 50 rads per hour and the actual expected exposure in the valve location is 1.9 rads per hour.

#### 5.2.3.3 Conclusion

The SSAT determined that this allegation was not substantiated. The SSAT concludes that the rubber hose attached to the valve will not be affected by radiation exposure.

#### 5.2.3.4 Action Required

None

## 5.2.4 Valve Extension Interferences

### 5.2.4.1 Characterization of Allegation

It is alleged that manual remote operators for Valves Nos. 1/CV-0254A and 1-CV-0092/TCV-03814 are in contact with an electrical conduit and a pipe support, respectively. No nonconformance reports were written to document these interferences and no corrective action was taken.

### 5.2.4.2 Details

The SSAT reviewed the design control documentation referencing the correction of the interference conditions for these valves. The design changes were completed under Field Change Request, FCR No. BP-02542 and Drawing No. 8373D04 for valve 1/CV-0254A and FCR No. DP-07266 and Drawing No. 4M369PCV217 for valve 1/CV-0092/TCV-03814. The SSAT performed a field walkdown and a limited inspection of the as-built configuration of the subject valves to verify items such as adequate clearances between components and the manual remote operators, utilization of correct hardware, valve location and orientation, heat numbers and material traceability. These items were all found to be acceptable. The SSAT also noted that the manual remote operators for the subject valves were classified as non safety-related class 9 components per the supplier bill of materials and HL&P Specification No. L639T50507. In addition, all engineering and QC installation inspection records were reviewed and found to be acceptable. It was also determined that no NCRs were written to document those interferences because the installation was considered to be in-process and non safety-related.

The SSAT also reviewed two NRC Region IV Inspection Reports, Nos. 50-498/87-07; 50-499/87-07 dated June 3, 1987 and 50-498-30; 50-499/87-30 dated October 6, 1987, in which this concern had previously been evaluated. The reports indicated that these items were identified

by HL&P on the Master Completion List (MCL) prior to the time the alleged identified the problem during a tour of the plant on October 7, 1986. HL&P's SAFETEAM documentation under an HL&P Memorandum dated September 25, 1987 also evaluated this issue. The SSAT found that the rework which corrected the interference problems was not performed until after the alleged's tour of the plant. During the field walk down the SSAT also inspected several other valves installed in safety-related systems for the following alleged discrepancies: interferences between remote valve operators and other components, excessive remote valve extensions, valve inaccessibility, and reversed valve installation. No discrepancies were noted.

5.2.4.3 Conclusion

The SSAT determined that allegation was substantiated in part due to the fact that the interferences had existed between the manual remote operators on the subject valves and other components. However, these interferences were identified, documented, and the appropriate corrective action was taken.

5.2.4.4 Action Required

None

### 5.3 Heating, Ventilation and Air Conditioning (HVAC)

#### 5.3.1 Installation Cookbook

##### 5.3.1.1 Characterization of Allegation

It is alleged that the "Cookbook" was confusing and difficult to interpret and it was subject to extensive revisions. The "Cookbook" was supposed to have universal application with respect to HVAC hangers and supports. In theory, a craftsperson in the field could take the shop prepared pieces for a given hanger or support and, using the "Cookbook", readily determine how to assemble and install a hanger or support at any specified location. The "Cookbook" was supposed to provide all requisite information, including hanger or support configuration, assembly and weld details, and installation details to cover all possible field conditions.

There are concerns that (1) HVAC duct hangers and supports may not be adequate because of misinterpretation of the "Cookbook" for any given application, and (2) that the revisions to the "Cookbook" may have caused existing hangers and supports to be in non-conformance with current criteria even though the hangers or supports might have originally been installed correctly.

The SSAT interviewed one alleged who had expressed concerns regarding use of the "Cookbook". This alleged was unable to identify any specific examples of how and where use of the "Cookbook" resulted in unacceptable installations of HVAC hangers and supports. In addition, it was not clear whether the alleged was relating first hand experience, or passing on second hand information. Also, SSAT review of GAP files was equally unproductive with respect to identifying specific examples of unacceptable HVAC hangers and supports resulting from use of the "Cookbook."



### 5.3.1.2 Details

The SSAT determined that use of the "Cookbook" in the field as the basis for installing HVAC hangers and supports was stopped sometime in 1983. The fact that the "Cookbook" was no longer in use was an indication to the SSAT that the allegation might be substantiated, at least in part. To further pursue this possibility, the SSAT requested that HL&P assemble a complete package which detailed when use of the "Cookbook" was stopped, how much HVAC duct work had been installed at the time its use was stopped, and what effect the use of the "Cookbook" had on the adequacy of HVAC hangers and supports for their intended purpose.

HL&P provided copies of the appropriate sections of "Specification For The Installation of Safety Class and Nonsafety Class HVAC Equipment and Ductwork for the Houston Lighting and Power Company South Texas Electric Generating Station 5V279VS1003" (referred hereinafter as the specifications). The data provided by HL&P includes Revision 0, Addendum 1, Revision 1 and Revision 2 of the appropriate sections of the specifications. HL&P also provided Specification Change Notices (SCN) F-3, 6 and 9. The SSAT reviewed the data provided and made the following observations. In Revision 0 of the specifications dated December 28, 1982, Paragraph 5.2.1.3 reads, in part, that "all HVAC supports shall be erected in accordance with HVAC Supports Design Manual (the Cookbook)---." Addendum 1 to the specifications, dated June 29, 1983, changed Paragraph 5.2.1.3 to read, in part, that "all HVAC supports and flanged members shall be erected in accordance with Duct Fabricator's drawings reviewed and released by Bechtel or in accordance with Manual of HVAC Ducts and Duct Supports---." SCN 9, dated January 28, 1984, further revises Paragraph 5.2.1.3 of the specifications to read "HVAC duct supports shall be installed and inspected in accordance with duct support detail drawings (Cut Sheets) prepared by the Duct Fabricator and accepted by Bechtel Site Engineering." In summary, the data provided by HL&P documents the evolution from primary reliance on the "Cookbook" to elimination of

the "Cookbook" as a field guide for installation of HVAC duct and duct supports. This evolution occurred in just over one year (12/83 to 1/84). Since January 1984, all HVAC ducts and duct supports have been erected using cut sheets which show all installation details and which leave nothing to be interpreted by field personnel.

HL&P also provided computer printouts which listed the completion dates for HVAC duct installations at STP. For the period from December 1982 to January 1983, very little HVAC duct was installed in Unit 1 and none was installed in Unit 2. Prior to December 1982, the major HVAC activity at STP was removal of duct and supports installed by Brown & Root. In summary, the SSAT determined that only a small percentage of the HVAC duct supports in Unit 1 were installed using the "Cookbook".

The last data package provided by HL&P included a selection of inspection packages covering inspections of HVAC installations by Ebasco QC. These reports covered both early duct installations and early inspections. While a number of the packages reviewed included rework requirements for the item inspected, the SSAT determined that all inspection packages indicated that inspection of the HVAC installation was done in accordance with cut sheets and not the "Cookbook."

#### 5.3.1.3 Conclusion

The SSAT determined that:

- 1) The allegation regarding the "Cookbook" was partially substantiated to the extent that it was confusing. This determination is based on discussions with NRC Resident Inspectors, discussions with HL&P personnel, actions taken by HL&P/Bechtel to eliminate field use of the "Cookbook" and SSAT independent assessment. That portion of the allegation which addresses the possibility that use of the

- "Cookbook" resulted in unacceptable installations could not be substantiated. The documentation reviewed by the SSAT shows that some HVAC duct supports did require rework, but the root cause of the defects could not be determined; i.e., it could not be shown that misinterpretation of the "Cookbook" was the cause.
- 2) Only a limited amount of HVAC duct supports in Unit 1 were installed using the "Cookbook" for guidance. The majority of HVAC duct supports were installed in accordance with cut sheets. All HVAC duct supports in Unit 2 were, or will be installed in accordance with cut sheets. All QC inspections in Units 1 and 2 were, or will be done using cut sheets.

In summary, the SSAT concludes that the HVAC ducts supports for STP - Units 1 and 2 were installed in accordance with design.

5.3.1.4 Action Required

None

5.3.2 Miscellaneous HVAC Allegations

5.3.2.1 Characterization of Allegation

It is alleged, in general, there were problems with:

- a) Ductwork and welds were not cleaned prior to painting.
- b) HVAC material stolen, the heat number removed from the material, and new heat number was inscribed by the person(s) stealing the material.

- c) Separation of HVAC ducts from piping, hangers, conduits, and embedments for seismic considerations.
- d) Caulking used to seal HVAC plenums.
- e) HVAC damper in the emergency diesel generator (EDG) building for Unit 2 was found to be defective, and that the corresponding damper in the EDG building for Unit 1 had not been tested.
- f) Ductwork in EDG building was signed off as complete by QC when in fact, it was not complete.

Each of these seven allegations was initially reviewed at the GAP offices prior to the SSAT inspection at STP. The SSAT was unable to obtain any specific data from the allegor files maintained by GAP, and none of the individuals associated with these allegations was made available for interviews by the SSAT.

#### 5.3.2.2 Details

Due to lack of specificity, the SSAT performed a broad, general inspection in the HVAC area of Units 1 and 2 in order to assess the above concerns raised by the allegors.

- a) The allegor is concerned that ductwork and welds were not cleaned prior to painting. The SSAT's understanding of this allegation is that the welds were not cleaned to remove slag, and inspected prior to painting. The SSAT inspected numerous welds at random locations throughout both Units at STP and were unable to identify any unacceptable welds. Unacceptable conditions such as porosity, undercut, or inadequate weld size can be identified even if the weld is painted.

- b) The SSAT understanding of the alleged concern is that HVAC material was stolen, the heat number removed from the material, and new heat number was inscribed by the person(s) stealing the material. No further details were made available to the SSAT. In the absence of specific locations, the SSAT was unable to identify the concern of this individual. As a result, the SSAT review HLP's fabrication and installation process for HVAC material and it was determined that in certain cases HVAC material is fabricated and issued for a specific purpose, location and application. Therefore, if a portion of ductwork, or its structural support steel is lost or stolen, it could not be substituted in the field for the reasons stated above. The SSAT also determined that in all safety-related applications there was QC involvement to not only verify that the correct identification Nos. were present but that the correct material was utilized, proper installation was performed (i.e., material fit-up) and that the compatible filler weld material was used. In addition, the SSAT performed field walkdowns and documentation reviews and did not identify any abnormalities with HVAC welds, sheet metal materials or fabrication, and its structural support steel.
- c) This allegation addressed the separation of HVAC ducts from piping, hangers, conduits, and embedments for seismic considerations. One allegation states that HVAC ducts could be less than the required distances from piping, hangers, etc. The other allegation states that compliance to seismic tolerances is indeterminate. There were no specifics as to what systems, locations, tolerances violated, or time frame during which they occurred. The allegeders were not made available to be interviewed by the SSAT in order to obtain specific data. However, SSAT conducted several field walkdowns during which no instances were identified where ducts were routed in such a manner that other equipment would interfere with them during a seismic event.

- d) This allegation concerned caulking used to seal HVAC plenums. The allegor asserts that the caulking used could not withstand the plenum pressure which resulted in leaks. The SSAT has reviewed the allegors file at the GNF office and have concluded that the plenums are located in the STP fuel handling building. Beyond that, no specifics are given, and the allegor was not made available for interview by the SSAT. However, the SSAT determined that all HVAC systems for STP Unit 1 have been successfully tested for proper operation, and any system leaks that may have occurred have been corrected.

While the SSAT was at STP, an issue pertaining to HVAC duct gasketing material was raised at Comanche Peak. This gasket material, TREMCO 440A, was found to be highly flammable. The same material is used extensively at STP. The SSAT will follow the gasket material issue at Comanche Peak through resolution and then determine its applicability to STP.

- e) This allegation concerned a HVAC damper in the emergency diesel generator (EDG) building for Unit 2 that was found to be defective, and that the corresponding damper in the Unit 1 EDG building had not been tested. The SSAT was unable to determine the damper identification and the allegor was not made available for interview by the SSAT. However, the SSAT determined that all Unit 1 HVAC systems, including those in the EDG building, have been tested for proper operation and found to be acceptable. The SSAT determined that system testing includes proper operation of all dampers, including the damper of concern to the allegor.
- f) This allegation addressed ductwork in the EDG building which was signed off as complete by QC when in fact, it was not complete. The allegor files reviewed by the SSAT did not contain any specific safety concerns regarding the above ductwork, and the allegor was not made available for interview by the SSAT. As a result, the SSAT performed a field walkdown of all Unit 1 EDG

building HVAC ductwork to determine if in fact all HVAC installation was complete. The SSAT then reviewed the applicable installation records (i.e., traveler packages and weld records) and no deficiencies were noted. Also, the SSAT conducted interviews with qualified operations personnel and performed further reviews of the documentation and determined that all Unit 1 HVAC systems, including those in the EDG building has been completed and tested through start-up testing and no deficiencies were identified during the inspection.

#### 5.3.2.3 Conclusion

Based on the results of field inspections, the SSAT determined that allegations a), b) and c) were not substantiated. However, the wrongdoing aspects of allegation b) have been referred to NRC OI for further review.

Based on the lack of specific information, and considering that all Unit 1 HVAC systems have been successfully tested, the SSAT concludes that allegation d) was not substantiated.

Allegation e) concerns <sup>ing a defective</sup> ~~that~~ a HVAC damper in the EDG building for Unit 2 was not substantiated due to lack of specific information. With regard to the concern that the corresponding damper in the Unit 1 EDG building has not been tested, the SSAT concludes that the damper of concern to the allegor has been tested. Thus, this part of the allegation was also not substantiated.

Based on the results of field inspections and the system testing performed, the SSAT concludes that the safety-related aspects of allegation f) were not substantiated. However, the allegation is classified by SSAT as wrongdoing and has been referred the NRC OI for further review.

## 5.4 Fastners

### 5.4.1 Hilti Bolts

#### 5.4.1.1 Characterization of Allegation

It is alleged that Hilti-Kwik concrete expansion anchor bolts were not installed according to site procedures. An interview was conducted with the alleged who acknowledged that installation problems with the bolts were corrected.

#### 5.4.1.2 Details

The SSAT reviewed STP site procedures for the selection, installation and inspection of concrete expansion anchors. Brown & Root (B&R) Quality Construction Procedure CCP-23 "Installation of Safety Related Concrete Expansion Anchor Bolts," Revision 0, dated October 23, 1979 through Revision 2, dated September 16, 1987 required that a field request for engineering action (FREA) must be prepared whenever expansion anchor bolts are to be used in locations specified by the engineering drawings. The procedure refers to the South Texas Project Technical Reference Document No. 5AC195Q010, "Design, Installation, Testing and Inspection of Concrete Expansion Anchor Bolts." It states that the approved concrete expansion anchors to be used are Hilti-Kwik bolts purchased as safety related material and they are the only type to be used for permanent safety related installations. It further describes the inspection, verification and surveillance and other aspects of construction procedure as related to installation of expansion anchors.

The SSAT reviewed the current training program used at STP for the instruction of workers in the installation and inspection of concrete expansion anchor bolts. Training Procedure No. QCP-2.1, "Indoctrination, Training and Qualification of Quality Control Personnel to ANSI N45.2.6 and ASME Section III, Division 2 Requirements," Revision 0, was issued on March 25, 1982. The SSAT was informed by HL&P



personnel that the training program has been implemented from the beginning of construction and the instruction was provided by the Hilti staff.

SSAT also reviewed the Procedure SSP-14, "Stud Anchor Installation and Inspected," Revision 0, dated October 25, 1985, through Revision 2, dated December 18, 1987.

SSAT reviewed QTIPS Module IV-4 "Installation and Inspection of Concrete Anchors" which was used as training material by Ebasco Construction Inc. (ECI) personnel who conducted training classes on installation of concrete anchors. In addition, the SSAT reviewed two project quality assurance surveillance reports dated July 30, 1984, reporting over the period of July 23 through July 26, 1984 reviewed, which describe the Hilti anchors drilling demonstrations performed by ECI. The reports indicate that drilling of concrete was supervised and was not performed in a random fashion.

SSAT reviewed NRC Inspection Report 50-498/86-13 which describes concerns regarding anchor bolts. The report states that the NRC inspectors concerns were well founded. However, there was no notice of violation issued because the deficiencies which previously existed had been corrected.

On January 30, 1988, SSAT interviewed the alleged, by telephone. The alleged stated that approximately in June 1985, he noticed Hilti bolts had not been installed according to the procedure by unqualified craftworkers. He also stated that the problems were corrected.

#### 5.4.1.3 Conclusion

The SSAT determined that the allegation was not substantiated. The SSAT determined that the craft received appropriate training in the installation of the Hilti anchors from the manufacturer and that the QA/QC program ensured the adequacy of installation. The SSAT

determined that although the formal training program was introduced in 1979 by the issuance of the procedure CCP-23, "Installation of Safety Related Concrete Expansion Anchor Bolts," the training of the craft and quality control was initiated at the beginning of construction.

5.4.1.4 Action Required

None

5.4.2 Threaded Fasteners

5.4.2.1 Characterization of Allegation

It is alleged that threaded fasteners were manufactured abroad and imported to the USA, and they were manufactured according to the standards which might have been different from the ASTM and ASME applicable requirements. Two vendors were identified as supplying questionable fasteners: Lone Star Screw Company and Cardinal Industrial Products Corporation.

An interview was conducted with two allegeders that indicated that the fasteners of suspicious origin might be found on either Units 1 or 2 high pressure piping and equipment. The allegeders did not provide more details regarding the location of questionable fasteners.

5.4.2.2 Details

The SSAT concentrated its review on three issues: 1) what was the effort initiated by Bechtel Energy Corporation (BEC) to verify the adequacy of fasteners procured by Brown and Root, Inc., (B&R) prior to the time when Bechtel became the Architect/Engineer (A/E) in

1984, 2) what were the procurement procedures followed by the original A/E, B&R, and 3) what are the current procurement practices by the present A/E, BEC.

The allegations identified two suppliers, the Lone Star Screw Co., Inc., and the Cardinal Industrial Product Corporation as being delinquent in supplying questionable fasteners. These concerns were raised also by BEC, during the turnover review program and by the NPC staff inspections. The BEC program did not include threaded fasteners which were supplied with components of materials or equipment, nor threaded fasteners purchased by the BEC home office. It concentrated on the threaded fasteners purchased by the job site.

The results of this turnover review effort by BEC are summarized in a report entitled "Program for the Verification of the Adequacy of Threaded Fasteners," dated September 13, 1984, Revision 2.

The program included: sample testing of pertinent attributes of those threaded fasteners needed for construction but having incomplete documentation; a review of documentation and generic concerns on threaded fasteners; engineering evaluations of potential concerns identified in the review of documentation; and a testing program to determine adequacy of fasteners (used or to be used) which had incomplete documentation and could not be corrected by the vendor. The program review of documentation identified seven concerns which required further clarification. These seven concerns involved three vendors. Lone Star Screw Company (Lone Star) among them. A generic Non Compliance Report (NCR) was generated to document the concerns with these vendors, the one against Lone Star being BM-00134.

Lone Star provided the requested documentation which resolved all but nine line items listed on the generic NCR written to document missing test results on Lone Star Purchase Orders (P.O.). The issue was that

Lone Star could not find test results for P.O. 12035 items 40-47, (A-307 bolts), and proof load tests results for P.O. 14176 item 4, (A194-2H nuts). In order to verify adequacy of these items, samples were sent to Coffer Laboratory for testing. Since all items (40-47) of P.O. 12035 were of the same heat, (2070388) only four samples needed to be tested. Out of these, item 40 was tested for hardness, and items 41, 42 and 47 for tensile strength. The SSAT reviewed Coffer Laboratories Inc. test results, #2777-83 dated July 15, 1983, #2778-83 dated July 19, 1983, #2779-83 dated July 15, 1983 and #2780-83 dated July 19, 1983, which provided the required information and indicate that the samples were tested satisfactorily and in accordance with Coffer Laboratories 1983 QA Systems Manual, Revision 4, approved by Bechtel Power Corporation on June 15, 1983. The SSAT also reviewed Coffer Laboratories Test Report No. 2781-83, dated August 1, 1983, which states that six nuts were received for proof load testing in accordance with the specification ASTM-A194-82A grade 2H Heavy Hex and were found to be satisfactory after proof loading.

The SSAT reviewed a memorandum to B. P. McCullough dated July 26, 1983, which contained the final list of Purchase Order line items which had been determined to be acceptable for release to construction. The memorandum states that the remaining line items (40-47 of P. O. 12035 and 4 of P. O. 14176) which are currently being tested will be dispositioned by NCR No. BM-00134. Item 7 of Attachment 3 to NCR BM-00134 states that Items 40-47 of P. O. 12035 are acceptable and Item 9 states that Item 4 of P. O. 14176 is acceptable. The SSAT was informed that during the time of the BEC investigation of field purchases there were some fasteners that had already been installed in the field. Since all of the P.O.s have been accounted for and all of the material had been found to be acceptable, the question of whether the item is in stock or on the equipment becomes moot.

Parallel to the investigation conducted by the field office of the adequacy of fasteners described above, BEC Engineering also reviewed the B&R records for fastener procurements. The SSAT determined that the outcome of this investigation was that all of the material provided by Lone Star was found to be acceptable with the exception of Items 58, 59 and 62 of P. O. 35-1197-0343. These items required additional testing and records review.

Two MCRs were written against these items. NCR BP-C3364 states that the Lone Star test reports required the nuts to be ASME Section III, SA 194-74 Grade F6 Heavy Hex. However, "F" designation was non-existent in the 1974 edition of ASME Code. This matter was dispositioned because it was found that 1974 S-76 edition of the code added the designation "F" to distinguish the three different chemistries for Grade 6 material. NCR BP-C3765 states that a cone strip test of 108, 750 lbs is required. SSAT reviewed the disposition of this NCR and determined that the nuts were subjected to the required proof load tests and may be "used-as-is."

In conclusion, the SSAT determined that all Lone Star material was found to be acceptable and that there was no need to charge any hardware.

The SSAT reviewed records pertinent to fasteners purchased from Cardinal. B&R purchases were made by the field office as well as by engineering. BEC's review determined that there was no record of any purchases by B&R of any fasteners from Cardinal.

In 1984, Bechtel representatives visited Cardinal's facilities to evaluate the impact on material shipped to STP as a result of NRC staff findings relative to deficiencies with materials supplied by Cardinal. Two questions were raised, namely, the hardness test utilized by Cardinal (Izod impact method rather than Charpy) and stress relieving temperature being below the minimum required. The Bechtel trip report recommended that the above questions be subjected to an engineering evaluation.

SSAT examined NCR No. BC-00469 which contains resolution of all identified deficiencies with Cardinal materials procured for STP. Basically, the NPC stated that Cardinal did not provide justification for the heat treatment temperature used on applicable Cardinal Certified Material Test Report (CMTR). The material in question was manufactured by Sumitomo Shoji Kaisha, Ltd., Japan, and the temperature range listed on the CMTR was lower than that specified by the ASTM Specification for A 193-B7 (1040 degrees F vs 1100 degrees F). Another problem identified was that Cardinal's Customer Certifications Reports stated Charpy impact tests, had been used, but other supporting documents obtained by Bechtel indicated Izod impact test were utilized. In view of the uncertainties listed above, Bechtel decided to return most of the Cardinal material to the vendor (Shipping Notice No. 3678). Furthermore, Cardinal was requested to provide amended Certified Material Test Reports (CMTR's) for the material not returned, consisting of heat Nos. x 107E, 9723D, 9423E, 9814D, 8724B and N630B after the required Charpy V-notch testing has been performed. SSAT examined NCR BC-00469 which signified acceptance and completion of the tests by QC and also the modified CMTRs from the Cardinal.

The SSAT interviewed two allegers to try to determine more specific information regarding the faulty fasteners. The allegers informed the SSAT that some suspect bolts have dual markings: one forged marking indicating the manufacturer and the other stamped with letter "C", indicating that they were supplied by Cardinal. The allegers provided the SSAT with several examples of fastener markings of suspicious origins. The allegers also stated that the fasteners of suspicious origin might be found on high pressure piping and equipment on either of the two units of STP. The allegers did not provide the SSAT with any more details regarding the location of the questionable fasteners. The SSAT embarked on an inspection of bolts already installed in the field. During this effort SSAT inspected the following:

- 1) Unit I - Fuel Handling Building (FHB)
  - a) High Head Safety Injection Pump (E1.-29.0 ft)
  - b) Check Valve 1-SI-0002C (Train C)
  - c) Check Valve 1-SI-0002B (Train B)
  - d) Motor Operated Valve (MOV) No. 1-SI-MOV-0001E
  - e) High Head Safety Injection Valve (pump discharge)
  
- 2) Unit II
  - a) Containment Charging Pump Flange (discharge)
  - b) Positive Displacement Charging Pump (line No. CV2112-A-A1)
  - c) Heat Exchanger 3R191NAX1-01A
  - d) Pacific Check Valve (Penetration Room, E1. 34.0 ft)
  - e) Containment - Chemical Environment Control Letdown Heat Exchanger
  - f) Component Cooling Low Pressure line (E1. 57.0 ft) (Serial No. 2312-3B)
  - g) Residual Heat Removal Exchanger on Component Cooling Water line Train "B" (E1. 42.0 ft).

During the inspection, fasteners with a stamped letter "C" were observed by the SSAT but the forged markings specified by the allegor could not be found. The SSAT also inspected fasteners in field warehouse and found on them the markings from Cardinal. The SSAT determined that these fasteners were bought by Cardinal from Guyon Alloys. Records reviewed by the SSAT indicated that heat numbers and NCR BC-00469 they identified these fasteners to be from the same P.O. as those which had been retested because the wrong hardness test was used and a lower stress relieving temperature was specified. The SSAT did not observe any deficiency in documentation reviewed.

The SSAT determined that STP is currently embarked on a testing program of fasteners in response to NRC Bulletin 87-02. The results of the sampling and testing of fasteners used at the STP were being

## 5.5 Welding

### 5.5.1 Weld Rod

#### 5.5.1.1 Characterization of Allegation

It is alleged that faulty weld rods were used in welding all over the site by all disciplines for approximately six months and that the flux on this weld rod was uneven, causing "finger nailing" and "toe nailing". These conditions relating to arc stability could cause porosity and poor quality welds.

An interview was conducted with the alleged who provided additional information in support of this allegation as indicated below.

#### 5.5.1.2 Details

The alleged faulty weld rod being referred to was type E6013 (AWS - Classification for high titania potassium coated covered mild steel welding electrodes used in the shielded metal arc welding process). This faulty material was alleged to have been used under welding procedure specification no. WP-167, and to have been utilized for approximately six months to a year, from mid 1985 to late 1986. The faulty welding electrodes were manufactured by Atomarc and used by HVAC and other discipline welders. In response to the SSAT requests for information about specific locations where the weld rod was used and where defective welds might be located, the alleged stated that it had been used in the fuel handling building (FHB), the mechanical auxiliary building (MEAB), reactor containment building (RCB), diesel generator building (DGB), and the turbine generator building (TGB), at all elevations. The reactor containment fan cooling system duct patch plates in the RCB were cited as a specific locations where the faulty weld rod was used.

The SSAT reviewed documents relevant to the inspection of this allegation including welding procedure specifications nos. WP-167 and WP-5,



weld rod purchase orders, Standard Site Procedure SSP-30 entitled "Weld Filler Metal Control," Situation/Problem Investigation Report S-13 dated September 20, 1985, HL&P's SAFETEAM records of welding-related allegations, and a list of controlled welding material reference numbers. Based on the results from the review of weld rod purchase orders, the list of controlled welding material reference numbers, and welding procedure specifications nos. WP-167 and WP-5, the SSAT determined that type E6013 electrodes had neither been purchased nor required by the specifications. The electrode types required by WPS-167 are E6010 (high cellulose sodium covered) and E6011 (high cellulose potassium covered) while the higher strength E7018 (iron powder, low hydrogen covered) electrode was required by WP-5. A review of the HL&P's SAFETEAM records and NRC Region IV inspection reports by the SSAT did not reveal any concerns with the E6010 or E6011 electrodes. However, several concerns had been expressed regarding type E7018 electrodes manufactured by Oerlikon Welding Industries. Since the Situation/Problem Investigation Report involving Oerlikon supplied material fell within the time frame that the alleged faulty weld rod was used at STP facility, and the fact that E6013 electrodes appear to have never been used, the SSAT decided to investigate the use of the Oerlikon supplied E7018 electrodes and assess the safety significance of its use.

From the SSAT review of documentation concerning the Oerlikon E7018 welding material, Bechtel Energy Corporation was found to have conducted an extensive audit of the manufacturing facility of Oerlikon Welding Industries, Inc., a local supplier. After satisfactory results were obtained from the audit, Oerlikon was added to the approved vendors list. Bechtel Energy Corporation subsequently issued purchase order no. 14926/BF4946 for 60,000 pounds of 3/32" diameter type E7018 welding electrode. On July 12, 1985, Bechtel received a partial shipment of the electrodes and began issuing the this material from lot no. 10450 for field use in early August 1985. HL&P's SAFETEAM documents show that complaints by STP site personnel of poor quality E7018 weld rod began after the early August 1985 date when the Oerlikon E7018 electrodes were issued.

Investigation of the complaints by Ebasco welding personnel determined that the flux coating on some of the Oerlikon E7018 electrodes was not uniformly deposited along the weld wire length and coatings were found cracked or broken. Since the flux coating provides shielding to prevent oxidation of the molten weld puddle, stabilizes the arc, and provides additives to produce the required material chemistry and mechanical properties, the flux coating irregularities discovered probably would have caused the conditions noted by the allegor.

The SSAT determined that following additional inspections of the material by Bechtel, Ebasco, and an Oerlikon Welding Industries representative, it was agreed that the flux coating on a significant number of rods in lot No. 10450 was unacceptable, thereby warranting return of the lot to the manufacturer. Of the 20,000 pounds of weld material in the lot, approximately 19,000 pounds were returned to Oerlikon Welding Industries in late August or early September 1985. -

In an effort to determine whether the E7018 electrodes in the unacceptable lot had been used in place of E6010 or E6011 electrodes for HVAC welding, the SSAT requested Ebasco to prepare weldments of the same material used in the HVAC system with two different type electrodes, E6011 and E7018. This was conducted to ascertain the typical bead characteristics of each electrode to aid in the HVAC weld inspections. The welds made with the E7018 electrode show a smoother surface profile than that made with the E6011 rod (see Figure \_\_).

The SSAT conducted an extensive visual inspection of numerous welds on ducts and supports in the HVAC system in the MEAB, RCB, DGB, FHR, and the space above the control room. Although most of the welds had been painted, thereby making it difficult to fully interpret each of the weldment characteristics, the visual inspections performed on the welds were sufficient to allow the SSAT to determine whether the welds were of good quality and appeared to meet design specifications and AWS Welding Code requirements. In addition, fourteen HVAC system support construction packages were reviewed by the SSAT for dates of

final sign off and completeness are compared to the Filler Material Issue Records (FMIR's) dates. Also, the SSAT reviewed the certifications of the welders who performed the welds on these supports. The SSAT determined that the documents were in order, the correct welding electrodes were issued, and the welders were qualified to weld to both applicable welding procedures, WP-167 and WP-5. The SSAT also determined that these weldments had been inspected and accepted by the QC organization.

#### 5.5.1.3 Conclusion

The SSAT determined that this allegation was partially substantiated in that a welding electrode problem had existed at STP in the time frame of concern. However, the welding electrode involved was E7018, not E6013, and the extent of the problem was not as widespread as the allegation indicated. The defective E7018 electrodes represented only a small percentage of the total filler material on site, and corrective action had been promptly implemented to preclude its widespread use and to identify and repair faulty welds if necessary. Furthermore, the SSAT did not find any evidence of faulty structural welds (where E7018 is used) during its inspection of STP.

#### 5.5.1.4 Action Required

None

### 5.5.2 Weld/Welder Identification Traceability

#### 5.5.2.1 Characterization of Allegation

It is alleged that welds were not stamped with the welder identification number at the time of completion but stamped later by welders who had not performed the welding and that the procedure for identifying welders who performed welds does not allow for traceability.

An interview was conducted with the alleged who provided additional information, as indicated below, in support of this allegation.

#### 5.5.2.2 Details

The alleged identified the concern to be with the structural welding in the HVAC system. Specifically, the HVAC welding in the mechanical and electrical auxiliary building (MEAB) was supposed to have instances where completed welds did not have the proper welders' identification stamps affixed. If the construction traveler packages did not indicate that the welds had been accepted by QC, the welds were ground out and the structure rewelded. However, in some instances, welds were stamped with welders' identification stamps according to filler material issue records (FMIRs) used to document the withdrawal of weld rod from an issuing station. According to the alleged, welders' identification symbols were stamped on welds by matching the dates on the FMIRs to dates that welders worked in the areas of the unstamped welds. Thus, it was alleged that the right stamp was not necessarily placed on the right weld. The time period cited by the alleged was between late 1983 to 1986.

The SSAT found from the records of HL&P's SAFETEAM investigations that eight cases of alleged loss of weld/welder identification traceability had been documented during the time period cited by the alleged. The SSAT reviewed NRC Region IV Inspection Report No. 50-498/86-38 that documented the findings of investigations performed by the HL&P's SAFETEAM and found that problems with quality control procedures for inspection of structural steel had existed in 1984. As noted in the inspection report, the quality control procedures at that time required each QC inspector to perform two in-process inspections per day and all final inspections of completed work. However, due to the thirty-to-one craft-to-inspector ratio that existed, considerable delays in QC inspections may have also contributed to allowing the condition to take place and to the delay in the prompt identification of this situation.

NOTICE OF PRESS CONFERENCE

U. S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF PUBLIC AFFAIRS  
REGION IV - ARLINGTON, TEXAS

For More Information  
Contact:  
Tom Smith, Public Citizen  
512/477-1155  
Richard Condit, JAP  
202/232-8550

**SUBJECT:** Is The South Texas Nuclear Project Safe Enough to Operate? A report to Texans by the Government Accountability Project on the significance of the nearly 400 safety allegations made by Whistleblowers.

**WHEN:** 1:00 - 2:00, March 2, 1988

**WHERE:** The Speakers Committee Room, State Capitol

**SPEAKERS:**

Billie Garde - an attorney with the Government Accountability Project. She has represented workers at seventeen other troubled nuclear plants across the country.

Edna Ottney - an investigator for the Government Accountability Project at the South Texas Plant. She has worked as an investigator at four plants and as a quality assurance engineer at two nuclear plants. While employed as a quality assurance engineer at the Clinton, Illinois plant, she wrote the program that was used for a complete review of all documentation and the "walkdown" used to assure that the plant was safe enough to operate.

**TOPICS FOR DISCUSSION**

\* The significance of the nearly 400 allegations regarding safety made by the 56 whistleblowers about the South Texas Nuclear Plant.

\* GAP'S attempts to get the Nuclear Regulatory Commission to fully investigate these allegations.

\* Why the NRC's recent investigation of these allegations was not adequate. Their investigation took only four days and they only looked at 60 of the allegations.

\* Why they believe the NRC should be required to do a full reinvestigation of all of the safety allegations at the plant and should be required to make a public report prior to licensing. ( A vote is currently scheduled for March 10, 1988.)

\*\*\* NOTICE \*\*\*

This press conference will follow an indepth briefing for Congressional and Legislative staff that will be held from 9:00 to 11:30 A.M., March 2, in Room 101 of the Reagan building. Press are invited to attend the earlier briefing for a more in-depth review of the allegations.

A summary of the allegations is on the reverse of this sheet.

FOIA-88-1077  
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HOW SERIOUS ARE THE ALLEGATIONS ?

The allegations include:

- \* crack in the floor of the fuel handling building
- \* willful cover-ups of serious design, hardware, and documentation discrepancies
- \* counterfeit fasteners that do not meet strength and heat specifications
- \* valves and piping are improperly installed and impossible or difficult to use in emergency situations
- \* interfering with, harassing, firing or intimidating workers who attempted to report safety concerns to their superiors or to the NRC
- \* coatings designed to protect workers from exposure to radiation are flaking off or cracked
- \* pipe joints and welds may not be adequate
- \* quality of certain welds in doubt

MANY OF THE ALLEGATIONS CONCERN COST OVERRUNS

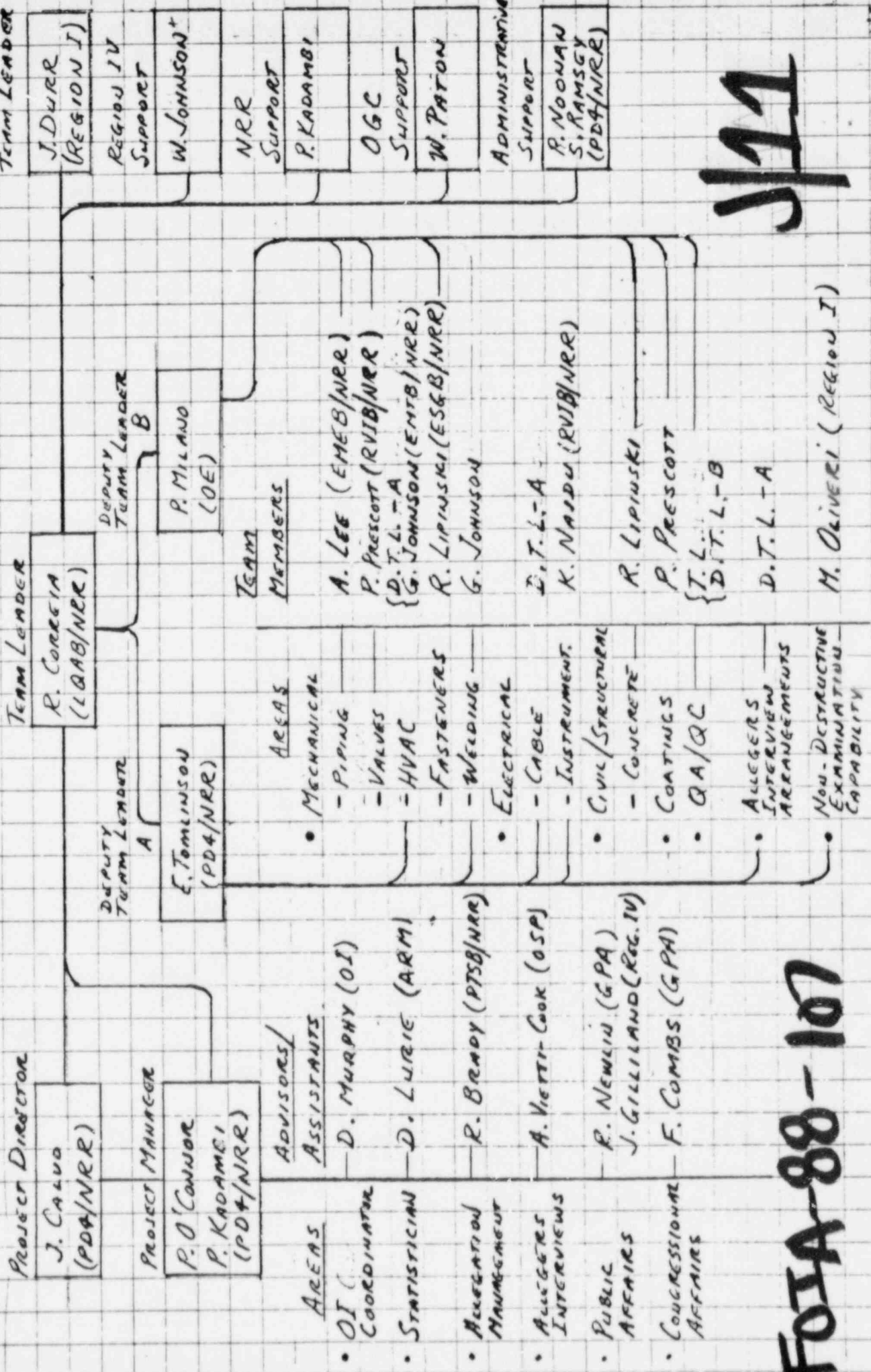
THESE ALLEGATIONS INCLUDE:

- \* intentional misrepresentation of quantities of materials installed,
- \* needless scrapping of over \$396,000 worth of useable materials,
- \* equipment installed out of order causing completed work to have to be ripped out to install equipment,
- \* contractors claimed incomplete work was complete and turned it over to H.L. & P. as finished. This will allow for work needed to complete the plant to be billed to the partners as operating and maintenance costs which are subject to much less regulatory scrutiny,
- \* inaccurate count of hours on specific jobs,
- \* hanging "miles" of heating ventilation and air conditioning ductwork that later had to be torn out because equipment that should have been installed first was not.

FOIA - 88-107  
FOIA - 88-141

SOUTH TEXAS PROJECT ALLEGATIONS  
NRC SAFETY SIGNIFICANCE ASSESSMENT TEAM (SSAT)  
INSPECTION EFFORT

4/4/88  
4/15/88  
4/19/88  
4/25/88  
3/21/88  
ADVISOR FOR  
TEAM LEADER



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