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SUSQUEHANNA STEAM ELECTRIC STATION

SUPPLEMENT TO

INVESTIGATION OF UNIT ONE

SMALL PIPING SYSTEM DESIGN

INSTALLATION AND INSPECTION

PROGRAM ADEQUACY AND IMPLEMENTATION -

PP&L AND BECHTEL QA COVERAGE

WHS for W.H. Gulliver 8-24-82
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I. OBJECTIVE

The objective was to determine whether PP&L and Bechtel Q.A. Programs covered the areas of concern identified during the PP&L Investigation of Small Pipe Design/Installation.

II. SCOPE

The scope was to review the documentation compiled by the PP&L and Bechtel Q.A. site organizations. This documentation was to reflect the site Q.A. activities conducted from January, 1981, through July, 1982, relating to small pipe design program. This investigation was conducted from August 19 to August 23, 1982.

III. Q.A. COVERAGE

A. Bechtel Q.A.

Generally, the audits performed by Bechtel were of enough detail and depth to indicate that there was sufficient review of the particular aspect of the system being audited. Bechtel MCAR's (Management Corrective Action Report) and QAR's (Quality Action Report) are written for any particular discrepancy (outside an audit scope) that requires corrective action and follow-up. The following are examples of audit findings and QAR's that indicated problem areas related to those found during the PP&L Investigation:

1. Audit #24-4-10, February, 1982, contained a finding that noted a non-compliance with the procedure for "voiding" drawings. (Another finding in this audit, although not related to the Investigation Report, reported that supervisor's signature (initials) being misused.)
2. Audit #'s 30-3-4, 30-3-5, 30-3-6, and 30-9-2, dated March, 1981, August, 1981, April, 1982, and May, 1982, respectively, discovered various instances of lack of controls for procedural implementation and engineering interfaces.
3. Audit #24-4-9, June, 1981, contained findings that indicated various areas in which the "as-built" configuration of the piping did not agree with the drawings.
4. QAR #859, July 30, 1982, dealt with Field Engineering not reviewing SPA Drawings in a timely manner.

5. QAR #856, July 22, 1982, deals with the deficiency identified in the design of "SPA 600" hanger.

B. PP&L Q.A.

During the period under review, there were seven (7) formal and seven (7) unannounced audits relating to the small pipe program. These audits covered such areas as document control, Q.C. Inspection, and design control (related to interface control and the use of the latest information for design verification). Numerous findings were identified during these audits and several of these still remain open. Some of the audits in which the findings were similar to those of the PP&L Investigation are:

1. Audit #C-82-14 (joint audit with Bechtel), April, 1982, in which some procedural control were lacking in the Resident Engineering Group.
2. Audit #C-81-06, January, 1982, identified problem areas in the Field Engineering locating hanger deficiencies in this walkdown.
3. Unannounced Audit #111, September, 1981, discovered various areas of procedural and implementation problems in the design portion of the small pipe program.
4. N-5 Package Review Audit #'s CL-48, May, 1982, CL-34, May, 1982, and CL-34, June, 1982, indicated areas in which there were drafting errors.

IV. CONCLUSIONS

- A. PP&L and Bechtel audits covered the programmatic/procedural aspects of the small pipe design/installation program, but did not include a technical review of these aspects.
- B. The Investigation Team had the benefit of technical support. The majority of the concerns identified during the Investigation were a result of the technical review. As a consequence of PP&L and Bechtel audits not having technical support, it cannot be expected that they would raise the same concerns that the Investigation Teams did.
- C. The reviewing of PP&L and Bechtel audits reveal that their frequency did not increase in porportion to work being accomplished during the "final hectic period" (April-June 1982). But both Bechtel and PP&L QA coverage of small pipe program existed in the forms of Bechtel QA surveillance of hanger

as-built installation (from Oct. 1981) and PP&L N-5 Package Review, which occurred from September, 1981, through July, 1982. These activities increased in proportion to the work being accomplished during the "final hectic period." These activities and any discrepancies were formally documented.

V. GENERAL INFORMATION

A. Persons Contacted

Gene Glorvigen	Bechtel QAE
Jitendra Khandhar	Bechtel QAE
Ross Beckley	PP&L Q.A.
Ted Newman	PP&L Q.A.
Ron Matthews	PP&L Q.A.

B. Documents Referenced

1. Bechtel Audits No's 30-3-4, March, 1981, 30-3-5, August, 1981, 30-3-6, April, 1982, 30-9-2, May, 1982, 24-4-10, February, 1982, 24-4-9, June, 1981, and 24-4-11, April, 1982.
2. PP&L Formal Audit No's C-81-06, January, 1982, C-82-09, March, 1982, C-82-13, June, 1982, C-82-14, April, 1982, 115, October, 1981 and 109, July, 1981.
3. PP&L Unannounced Audit No's. CL-4, August, 1981, CL-4, June, 1981, CL-4, June, 1982, CL-33, December, 1981, CL-4, December, 1981, CL-26, June, 1982, CL-26, January, 1981, CL-48, May, 1982, CL-34, May, 1982, and CL-34, June, 1982.
4. Bechtel QAR No's. 859, July 30, 1982, 856, July 22, 1982, 855, July 15, 1982, 841, May 28, 1981, 784, February 21, 1981, 744, October 5, 1981, 736, September, 11, 1981, and 678, March 1981.
5. Bechtel MCAR No's. 1-77, October 27, 1981, 1-73, July 2, 1981, 1-72, June 10, 1981, and 1-67, February 11, 1981.
6. Bechtel Management Audit conducted on 10/27-31/81.

BMS:lm
S-25

SMALL PIPING
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NRC CONFIRMATORY ACTION LETTER 82-21

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SMALL PIPING PROGRAM

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REMAINING ACTION (CORRECTIVE AND PREVENTIVE)

SCHEDULE

INTRODUCTION

NRC CONFIRMATORY ACTION LETTER 82-21

1. PENNSYLVANIA POWER AND LIGHT COMPANY WILL CONDUCT AN INVESTIGATION TO ASSURE THAT DESIGN CRITERIA AND ASSUMPTIONS WERE PROPERLY TRANSLATED INTO DESIGN DOCUMENTS AND IMPLEMENTED DURING CONSTRUCTION AND INSPECTION. THE INVESTIGATION WILL EXAMINE THE SMALL BORE PIPE DESIGN PROGRAM AS WELL AS OTHER SIGNIFICANT PROGRAMS.
2. IDENTIFIED DEFICIENCIES OR WEAKNESSES WILL BE EVALUATED, CORRECTIVE ACTIONS IMPLEMENTED, AND MEASURES ESTABLISHED TO PRECLUDE RECURRENCE.
3. THE LIST OF TECHNICAL ISSUES IDENTIFIED BY THE NRC AT THE JULY 28 AND 30, 1982, MEETING WILL BE EVALUATED, DISPOSITIONED, AND CORRECTED. RESOLUTION OF THESE ITEMS WILL BE PRESENTED TO THE NRC NOT LATER THAN AUGUST 25, 1982.
4. THE SMALL BORE PIPE PROGRAM WILL BE EXAMINED FOR PROGRAM ADEQUACY AND SAMPLED FOR DETAILED IMPLEMENTATION.
5. THE FINDINGS IDENTIFIED BY THE NRC AND THOSE SUBSEQUENTLY IDENTIFIED BY THE PPL REVIEW WILL BE EVALUATED. THE EVALUATION WILL COMPARE SIMILARITIES IN THE SMALL BORE PIPE PROGRAM WITH OTHER PARALLEL PROGRAMS FOR GENERIC DEFICIENCIES AND WEAKNESSES.



SMALL PIPE INVESTIGATION
NRC QUESTIONS - AUGUST 18, 1982

QC ACCEPTANCE OF INACCESSIBLE ATTRIBUTES

- 0 SIGNATURE DENOTES CLAMP LOCATION
ORIENTATION, ETC.
- 0 BOLTS NOT REQUIRED TO BE INSPECTED
BY QC IN INSTALLED POSITION
- 0 BOLTS RECEIPT INSPECTED BY QC
- 0 OTHER SPECIFIED BUT INACCESSIBLE
ATTRIBUTES - NCR
- 0 CONCLUSIONS
 - ALL REQUIRED ATTRIBUTES INSPECTED
 - SIGNATURE LEGITIMATE



SMALL PIPE INVESTIGATION
NRC QUESTIONS - AUGUST 18, 1982.

RESIDENT & FIELD ENGINEERS WORKING
TOGETHER - SAME SUPERVISION

- ① WORKED IN SAME LOCATION
- ① IMPROVED COORDINATION AND EFFICIENCY
- ① WORKED UNDER SEPARATE MANAGEMENT
- ① "LENT" ENGINEERS
 - APPLIES TO UNIT 2
 - SAME CALCULATOR/VERIFIER BACKED UP BY CHECKER AND SUPERVISOR
- ① CONCLUSIONS
 - ORGANIZATION LEGITIMATE
 - VERIFICATION PROCESS ASSURES SATISFACTORY DESIGN

SMALL PIPE INVESTIGATION
NRC QUESTIONS - AUGUST 18, 1982

ADEQUACY OF BECHTEL & PP&L QA COVERAGE

o BECHTEL

- 38. FORMAL AUDITS
- MCAR & QAR PROCESS PROVIDED
ADDITIONAL COVERAGE
- FINDINGS INCLUDED

INSTALLATION/DRAWING DISCREPANCIES
IMPROPER SIGNATURES
CLARITY OF INSPECTION ATTRIBUTES
CALCULATION PROCESSING

SMALL PIPE INVESTIGATION

NRC QUESTIONS - AUGUST 18, 1982

ADEQUACY OF BECHTEL & PP&L QA COVERAGE

• PP&L (JANUARY, 1982 - JULY, 1982)

- 14 FORMAL AUDITS
- 100% REVIEW OF N-5 PACKAGES
- AUDIT FINDINGS INCLUDED

PROCEDURAL CONTROL IN RE
IDENTIFICATION OF DEFICIENCY BY FE
PROCEDURAL PROBLEMS
DRAFTING ERRORS

• CONCLUSIONS

- BECHTEL & PP&L QA COVERAGE ADEQUATE
- MANHOURS INCREASED DURING APRIL - JULY,
1982
- PROBLEMS TYPICAL
- PROCESS NOT OUT OF CONTROL

SMALL PIPE INVESTIGATION

OBJECTIVES

- 0 ASSURE SAFE OPERATION
- 0 ASSESS ADEQUACY OF DESIGN/INSTALLATION/
INSPECTION
- 0 SUGGEST GENERIC DUPLICATIONS
- 0 ASSESS ADEQUACY OF QA COVERAGE

CONDUCT

- 0 TWO TEAMS
- 0 PROGRAM REVIEW
- 0 INTERVIEWS
- 0 WALKDOWNS
- 0 COMPARE NOTES
- 0 FEEDBACK TO
 - PLANT SUPERINTENDENT
 - REVIEW COMMITTEE
- 0 REPORT

SMALL PIPE INVESTIGATION

FINDINGS

INFORMAL CHANGES TO DESIGN CRITERIA

- ① FIELD CONDITIONS NECESSITATED MODIFICATIONS TO DESIGN
- ① COVERED - SPAN LENGTHS, OVERHANG, GEOMETRY ADJUSTMENT
- ① SHOULD HAVE BEEN FORMALIZED
- ① NOT USING MEMOS RESULTS IN MORE CONSERVATIVE DESIGN
- ① BECHTEL
 - REVIEWED MEMOS
 - INCORPORATED INTO DESIGN CRITERIA

SMALL PIPE INVESTIGATION

FINDINGS

AS BUILT DRAWING DISCREPANCIES

(0) VARIOUS FINDINGS REGARDING VOIDING,
ORIENTATION, USE OF REVISIONS

(0) INDICATIVE OF CONTROL/PROCESSING
PROBLEMS

(0) BECHTEL

- ASSESSES AS ISOLATED INSTANCES
AFTER REVIEW

- AS BUILT/RECONCILIATION PROCESS RESOLVES

- REVIEW PROCESS FOR UNIT 2

(0) PP&L CONCURS

SMALL PIPE INVESTIGATION

FINDING

FAILURE TO FORWARD DESIGN DETAILS

- 0 DRAWINGS HELD BY FIELD ENGINEERING
- 0 DRAWINGS NEVER GOT TO RESIDENT ENGINEERING
- 0 BECHTEL
 - RE RECEIVED DRAWINGS FROM SAN FRANCISCO FORMALLY
 - RE USE CORRECT DESIGN INFORMATION IN RECONCILIATION PROCESS
 - FIELD PROCEDURES - REVIEW AND REVISE
- 0 PP&L CONCURS

SMALL PIPE INVESTIGATION

FINDINGS

USE OF ENGINEERING JUDGEMENT IN AS BUILT RECONCILIATION

- LIMITS NOT DEFINED
- INCONSISTENT APPLICATION
- BECHTEL
 - QUALIFIED ENGINEERS (R.E. GROUP)
 - CONCURRENCE BY CHECKER AND SUPERVISOR
 - REVIEW AREA AND PROVIDE DIRECTION
- PP&L CONCURS

SMALL PIPE INVESTIGATION

FINDINGS

USE OF LATEST DRAWING REVISION IN THERMAL
WALKDOWN

0 FORMAT NOT DESCRIBED IN PROCEDURE

0 BECHTEL

- DRAWING USED FOR ORIENTATION

- REVIEW BASED ON FIELD CONDITIONS

- F.E. SUBSEQUENT REVIEW IF CHANGES
OCCURRED

0 PP&L CONCURS



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SMALL PIPE INVESTIGATION

FINDINGS

DESIGN CONTROL MEASURES

• SUMMARIZES SEVERAL FINDINGS/OBSERVATIONS

- ISSUANCE OF DESIGN DIRECTION
- INFORMAL TRANSMITTAL OF DRAWINGS
- DISTRIBUTION/CONTROL OF DOCUMENTS
- USE OF AS BUILTS

• BECHTEL

- MOST INSTANCES CITED WERE EXPLAINED AFTER FURTHER INVESTIGATION
- REVIEW AND REVISE CONTROL PROCEDURES
- QA VERIFIED COMPLIANCE WITH MINOR PROBLEMS

• PP&L CONCURS

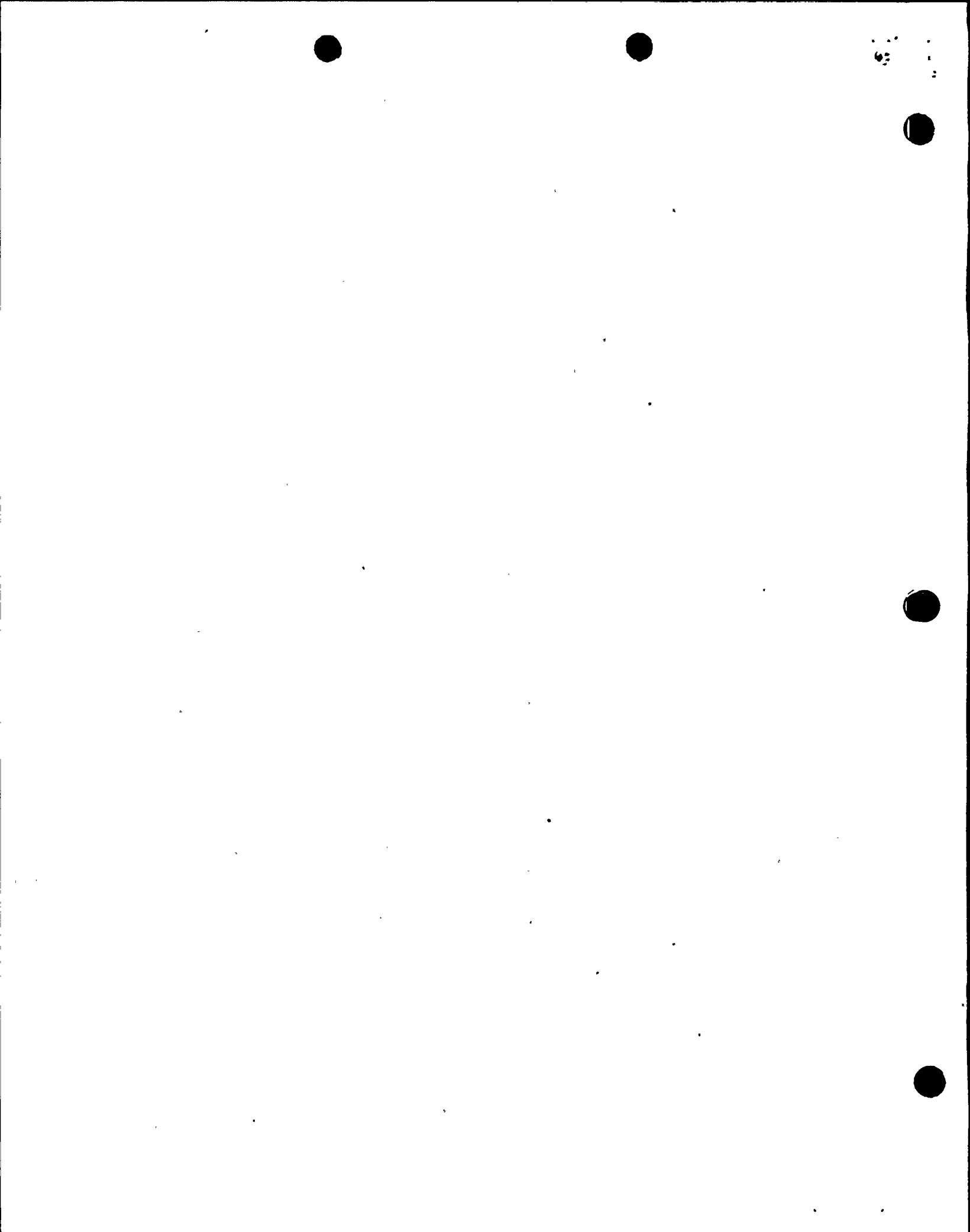


SMALL PIPE INVESTIGATION

FINDINGS

INSPECTION OF DETAIL 600 CLAMPS

- ① NO CRITERIA FOR EAR GAP MEASUREMENT
- ① WERE OTHER ATTRIBUTES MISSED IN ENGINEERING DEFINITION
- ① BECHTEL
 - SPA REVISED
 - REVIEW AND REVISE SPECIFICATION
- ① PP&L
 - 100% INSPECTION COMPLETE
 - CONCUR WITH BECHTEL ACTION



SMALL PIPE INVESTIGATION

FINDINGS

INSPECTION CRITERIA FOR PRE-FABRICATED COMPONENTS

0 NO INSPECTION REQUIREMENTS

0 EXAMPLES

- DETAILS 600 GAPS
- SWAY STRUT JAM NUTS

0 BECHTEL

- IDENTIFY ATTRIBUTES ON DESIGN DRAWINGS
- UPGRADE INSPECTION REQUIREMENTS
- GENERIC REVIEW

0 PP&L CONCURS

SMALL PIPE INVESTIGATION

CONCLUSIONS

SMALL PIPE PROGRAM

- ① REVIEW OTHER SMALL PIPE SYSTEMS
- ① EVALUATE UNIT 2 PROGRAM
- ① RE-DEFINE INTERFACE RESPONSIBILITIES
- ① REVIEW PROGRAMMATIC TRAINING
- ① EVALUATE QUALITY ASSURANCE COVERAGE
- ① STRONG WALKDOWN PROGRAM
- ① AS-BUILT PROGRAM ADEQUATE
- ① QC PROGRAM ADEQUATE, EFFECTIVE

GENERIC IMPLICATIONS

- ① REVIEW PROGRAMS WITH "SPLIT" DESIGN RESPONSIBILITY
- ① REVIEW DOCUMENTATION CONTROL PROGRAM
- ① INCREASE MANAGEMENT ATTENTION

PARALLEL PROGRAM GENERIC ISSUES

DESIGN CONTROL

- o CONTROL OF SPECIFICATION CHANGES (G-1-1)
- o ENGINEERING JUDGEMENT (F-1-3)(F-1-12)
- o QUALITY RELATED ACTIVITIES PERFORMED TO CURRENT DESIGN DOCUMENTS (F-1-4)

DESIGN INTERFACE CONTROL

- o DESIGN DIRECTION PROCESSING (F-2-1)

DESIGN CHANGE CONTROL

- o POST WALKDOWN CHANGES (F-1-15)

INSTALLATION AND INSPECTION

- o CRITERIA ADEQUACY

DOCUMENT CONTROL

- o CONTROL OF SPECIFICATION CHANGES (F-1-1)
- o CONTROL OF "RED LINE" DRAWINGS (F-1-2)

DOCUMENT CONTROL (CONTINUED)

- o CURRENT DOCUMENTS FOR QUALITY RELATED
ACTIVITIES (F-1-4)
- o DOCUMENT TRANSMITTAL (F-1-6)
- o DRAWING CHECKING/APPROVING



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SMALL PIPING PROGRAM

0 EVOLUTION

0 UNIQUE

0 DEFICIENCIES

0 COMPLETE DETAILED AS BUILTS

0 RESULTS

SMALL PIPE ADEQUACY

- o DESIGN APPROACH (M241) IS VALID AND CONSERVATIVE
- o ALL SMALL PIPING DESIGNED USING M241 OR DETAILED ANALYSIS
- o AS BUILT PROCESS GOOD, I.E. - GOOD CORRELATION
- o THERMAL INTERFERENCE AND STRESS WALKDOWNS WERE EFFECTIVE
- o RECONCILIATION EFFORT PROVIDES HIGH DEGREE OF CONFIDENCE THAT SMALL PIPING, AS INSTALLED, MEETS THE DESIGN INTENT
- o IDENTIFIED DISCREPANCIES IN THE RECONCILIATION PROCESS HAVE BEEN CONSISTENTLY SHOWN TO BE ISOLATED IMPLEMENTATION PROBLEMS , (NOT PROGRAM BREAKDOWNS) AND NOT SIGNIFICANT TO SYSTEM DESIGN ADEQUACY

CORRECTIVE ACTIONS TO BE ACCOMPLISHED

ACTION ITEM

CORRECTIVE ACTION FROM

DATE DUE

Perform a 100% inspection on all size 35 snubbers and a 10% inspection on the balance of Unit #1 snubbers to ensure clearance between the snubber end and clamp ear.

NRC Question #15

Prior to heat up exceeding 150°F

Review all Field Procedures involving Field Design for lack of clear direction concerning the review/checking and approval functions for design drawings and instruct the appropriate personnel as to the importance of adhering to the requirements in this area.

NRC Question #19

September 30, 1982

Bechtel Project Management will re-emphasize that project procedures must be used to change design documents and that greater caution must be exercised by engineering supervisors in deciding what constitutes a design change as opposed to engineering guidance.

Finding 1-1
Generic Concern 1-1

September 30, 1982

Field procedures will be revised as applicable to indicate time constraints on field engineering review of engineering designs and how to provide documentation of this review. Also Bechtel's computerized logs will be used to reconcile differences between engineering issued and field issued P.S. details. Q.C. will verify if there is any impact on the inspection performed.

Finding 1-5
Finding 2-1
Generic Concern 2-1

September 30, 1982



ACTION ITEM

CORRECTIVE ACTION FROM

DATE DUE

Bechtel Project Management will reemphasize with all supervision the need to comply with document control procedures and the requirements to verify that all quality related activities are being done with the current document revision.

Finding 1-5

September 30, 1982

Bechtel will reemphasize that all attributes absolutely necessary for design intent to be met, will be identified on the design drawings.

Finding 2-4

September 30, 1982

Finding 2-4

Pipe Support fabrication, installation, and inspection Specification M-213 (including Appendix F) will be revised to (1) amplify the need to inspect for vendor specified requirements and (2) identify all critical attributes on hanger design detail drawings thus establishing the need to inspect for these attributes.

Project Engineering will review and provide input to QC on hanger QCI's functional requirements and design intent. QC will revise QCI's as necessary.



MAJOR AREAS OF CONCERN

- o ADEQUATE INSPECTION AND INSTALLATION OF PREFABRICATED COMPONENTS
- o DESIGN DELEGATION - SPLIT RESPONSIBILITY
- o SENSITIVITY TO SCHEDULE PRESSURE
- o DOCUMENT CONTROL IMPLEMENTATION
- o DESIGN CONTROL SENSITIVITY
- o LACK OF "REAL TIME" PROGRAM REVIEW

