

FINAL REPORT
FOR
STP PRE-CAT VERIFICATION

Performance dates: May 6, 1985 to
June 24, 1985

Pre-CAT Team Leader

RJ. Ruckelshaus

Date Issued

January 18, 1985

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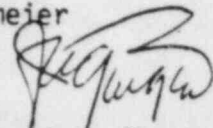
ACRONYMS

AC - Alternating Current
ACI - American Concrete Institute
A-E - Architect-Engineer
AISC - American Institute of Steel Construction
ANI - Authorized Nuclear Inspector
ANSI - American National Standards Institute
AQL - Acceptable Quality Level
ASME - American Society of Mechanical Engineers
ASP - Administrative Site Procedures
ASTM - American Society for Testing Materials
AWS - American Welding Society
BEC - Bechtel Energy Corporation
B&R - Brown & Root
CADD - Computer Aided Design Drafting
CAR - Corrective Action Report
CAT - Construction Assessment Team
CCP - Configuration Control Package
CCT - Change Concurrence Transmittal
CMTR - Certified Material Test Report
CRG - Content Review Group
CSP - Construction Site Procedures
DC - Direct Current
DCN - Drawing Change Notice
DEF - Deficiency Evaluation Form
DER - Deficiency Evaluation Report
DGB - Diesel Generator Building
DN - Deficiency Notice
DTI - Desktop Instruction
EAB - Electrical Auxiliary Building
ECI - Ebasco Constructors, Inc.
ECW - Essential Cooling Water
EDP - Engineering Department Procedure
EI - Effectiveness Inspection
E/I&C - Electrical/Instrumentation & Controls
ESI - Ebasco Services, Inc.
FCR - Field Change Request
FDCC - Field Document Control Center
FHB - Fuel Handling Building
FREA - Field Request for Engineering Action
FSAR - Final Safety Analysis Report
FW - Field Weld
HL&P - Houston Lighting & Power
HVAC - Heating, Ventilation and Air Conditioning
IEB - Inspection & Enforcement Bulletin
IN - Information Notice
INPO - Institute of Nuclear Power Operations
IOC - Interoffice Correspondence
IOM - Interoffice Memorandum
IR - Inspection Report
IRC - Incident Review Committee
ISI - In Service Inspection
KIP - (equals 1000 pounds of tension)
MAB - Mechanical Auxiliary Building

MAC - Maintenance Action Card
 MCC - Motor Control Center
 MEAB - Mechanical/Electrical Auxiliary Building
 MIC - Material Identification Control
 MIRC - Maintenance Instruction and Record Card
 MLCS - Material Labor Control System
 MOV - Motor Operated Valve
 MRR - Material Receiving Report
 MSA - Mechanical Shock Arrestor
 MT - Magnetic Particle Testing
 N/A - Not Applicable
 NCR - Nonconformance Report
 NDE - Nondestructive Examination
 NDT - Nondestructive Testing
 N/I - Not Incorporated
 NFC - Notice of Procedure Change
 NPSI - Nuclear Power Services, Inc.
 NRC - Nuclear Regulatory Commission
 NSSS - Nuclear Steam Supply System
 PCR - Procedure Change Report
 PCRT - Pre-CAT Response Team
 PCVT - Pre-CAT Verification Team
 PDC - Process Data Card
 PDM - Pittsburgh/Des Moines
 P.O. - Purchase Order
 PQAP - Project Quality Assurance Plan
 POT - Personnel Qualification Test
 PSI - Pounds per Square Inch
 PT - Penetrant Testing
 PTL - Pittsburgh Testing Laboratories
 QA - Quality Assurance
 QAE - Quality Assurance Engineer
 QC - Quality Control
 QCI - Quality Control Inspector
 QCP - Quality Control Procedure
 RAG - Records Acceptance Group
 RCB - Reactor Containment Building
 REA - Request for Engineering Assistance
 R.G. - Regulatory Guide
 RMS - Records Management System
 RT - Radiographic Testing
 SCN - Specification Change Notice
 SDDR - Supplier Deviation Disposition Request
 SDR - Standard Deficiency Notice
 SIRG - Site Integrated Records Group
 SNT - Society for Nondestructive Testing
 SQR - Site Quality Records
 SS - Structural Steel
 STP - South Texas Project
 TIR - Trend Investigation Report
 T.O.N. - Turn of the Nut
 TRD - Technical Reference Document
 W - Westinghouse
 WJE - Weiss, Jenney, Elstner and Associates
 WPP/QCI - Work Plan Procedures/Quality Control Instructions
 WPS - Welding Procedure Specification

Houston Lighting & Power Company

OFFICE MEMORANDUM

To J. T. Westermeier
From J. E. Geiger 
Subject South Texas Project Electric Generating Station
STP Pre-CAT Verification Final Report

August 8, 1985

Attached is the new Executive Summary for the STP Pre-CAT Verification Report which was distributed on July 18, 1985. This summary replaces the existing in its entirety.

JEG:jkg
Attachment

cc: J. H. Goldberg
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SECTION B

EXECUTIVE SUMMARY

- I. The purpose of the STP Pre-CAT (Construction Appraisal Team) verification effort was to assess the status of STP in terms of its readiness for the actual NRC CAT Inspection. The pre-CAT verification effort was based upon analysis of the results of NRC CAT inspections at other projects.

Another feature of the Pre-CAT verification was to provide the project with an opportunity to prepare itself for the types of support activities and response needs which can be expected during the NRC CAT inspection.

- II. Pre-CAT Verification Team (PCVT)

The verification team consisted of 10 individuals (contract personnel) working under the direction of the Project Quality Assurance Division of the HL&P Nuclear Assurance Department. These individuals possessed an average of approximately 12 years experience in the nuclear industry. The total number of present or past certifications (e.g., Lead Auditor, ANSI N45.2.6, AWS, SNT-TC-1A) held was 45, providing a broad scope of expertise across all disciplines/commodities reviewed.

- III. Pre-CAT Response Team (PCRT)

A project response team was assembled to support and coordinate the response activities related to the verification effort. This response team functioned under the direction of the HL&P Compliance Group and consisted of individuals who represented a cross-section of disciplines (e.g., Engineering, Construction, Quality Assurance, Quality Control, Material Control, Records) from HL&P, BEC, and ESI. This team provided day-to-day interface between the PCVT and the project.

- IV. Steering Committee

A project steering committee was formed consisting of management representatives from the Engineering, Construction, and Quality organizations from HL&P, BEC, ECI, and ESI. The PCVT and PCRT met with the steering committee on an approximately biweekly basis to discuss status and to-date findings. Based upon that information, the Steering Committee provided direction to the PCRT and took other actions as appropriate.

- V. Performance/General Results

The PCVT was divided into three separate groups - Electrical/I&C, Mechanical/NDE, and Civil/Structural. The actual in-plant verification effort lasted approximately seven weeks, and included the review of

both hardware and software (e.g., design, procedures, records) in twenty-two (22) different commodities/areas of activity, namely:

1. Piping/Welding
2. NDE - PT
3. NDE - RT
4. NDE - MT
5. Pipe Supports/Hangers
6. Mechanical Equipment
7. HVAC Supports
8. HVAC Ducting
9. Electrical/I&C System - DJ
10. Electrical/I&C System - PK
11. Electrical/I&C System - DG
12. Electrical/I&C System - VA
13. Electrical/I&C System - EW
14. Electrical/I&C System - CC
15. Cable Tray, Raceway
16. Cable Tray, Raceway Supports/Hangers
17. Category I Backfill
18. Concrete
19. Expansion Anchors
20. Structural Steel, Bolting
21. Post-tensioning
22. Coatings

In addition, the PCVT performed an assessment of twelve (12) other areas of activity, namely:

1. Material Control/Traceability
2. Material Storage/Staging
3. In-place Protection
4. Maintenance
5. Housekeeping
6. Design Adequacy/Control
7. Document Control
8. Inspection Procedures
9. Nonconformance Control
10. Corrective Action
11. Inspection
12. Records

PCVT verifications were made utilizing written checklists as guidelines. These checklists were formulated based upon the applicable STP design requirements and took into account those problems experienced by other nuclear projects during NRC CAT inspections (a total of nine (9) CAT reports of other projects were reviewed). Also considered were areas of perceived design or procedural inadequacy/omission which could have a bearing upon the adequacy of hardware to be verified.

PCVT assessments were accomplished in consideration of NRC review characteristics, other projects' problems, observed design and

procedural properties, and existing STP QA program requirements - again utilizing established checklists as appropriate.

The specific observations related to each area of PCVT review are contained in Section D of this report, and a listing of perceived deficiencies and concerns is provided in Section C. Review of those sections will provide the reader with a representation of where the project's strong and weak points are (in the PCVT's opinion) and specific information needed in order to address each issue raised.

Preliminary comparison (the final analysis cannot be until all details of the Final Report are addressed and resolved by the PCRT) was based upon the results of the reviews performed on the nine (9) NRC CAT reports at other projects. These reviews resulted in the identification of (all preliminary comparisons are approximations) 190 subjects of NRC identified problems elsewhere, consisting of 595 specific attributes which were subjected to criticism.

Comparison of the PCVT results to those CAT results determined to have been verifiable within the review scope of the PCVT (150 of 190 categories) indicated that STP is affected in 44% of the same categories as were other projects. These figures were tabulated conservatively and will more than likely be smaller in the final analysis. In any event, the overall PCVT evaluation of this project in comparison to others is that STP can be depicted as being, on a whole, about average.

There are, however, specific PCVT observations on STP which were not identified at other projects by the NRC and are not considered in the comparative evaluation, so the comparison should be considered only as a qualified measurement against others.

It is the consensus opinion of the PCVT that the most important long-term issues that must be addressed are:

1. Records - Section D of this report, Subsection VII, provides an overall evaluation of the PCVT's conclusions concerning records. Specific details concerning discrete records-related observations are found throughout Section D of the report. To summarize the PCVT conclusions, the following observations are provided.

There exists a large backlog of records to be processed at virtually every step in the records processing system - beginning immediately at inspection. This will more than likely draw adverse criticism from the NRC. Additionally, it was only with extraordinary effort by RMS personnel that the records requested during the pre-CAT verification were able to be produced.

The records review process implemented is cumbersome and was observed to be inadequate in many instances. Based upon observed records deficiencies, it can be concluded that the QC Supervisory review process (intended to be the validation activity from a technical and completeness standpoint) is not fulfilling its

charter. Although the PCVT observed no technical inadequacies, the number of completeness/administrative deficiencies observed were numerous.

After review and validation of QA records by QC, one other organization performs a technical review to verify that the records submitted for HL&P retention are technically adequate. The HL&P Records Acceptance Group (RAG) reviews sample of records which have already been accepted into HL&P custody.

Of the records reviewed by the PCVT, approximately 44% were in HL&P custody, i.e., had been processed through the Site Integrated Records Group (SIRG). All of the deficiencies identified by the PCVT have been classified as content/administrative in nature. It appears clear that the SIRG review process is deficient.

Based upon the PCVT observations, the following recommendations are made: (1) immediate efforts be undertaken to eliminate the existing records backlog; (2) QC Supervision be provided with whatever support/additional guidance is necessary to assure that their review activities identify and correct all document deficiencies which exist before their validation of the documents as QA records; (3) the charter of the SIRG be amended to include a technical review, or it should be replaced by a group which does in-line reviews of records from both a technical and content verification standpoint; and (4) no record should be accepted into HL&P custody which has not passed through this review process.

2. Design and Procedures "Workability," Inspection Planning - This issue is actually a combination of three and in the judgement of the PCVT has at least the potential for, and has more than likely already had, an adverse effect on the efficiency, effectiveness, and adequacy of QC inspections's in-plant verification activities. These three topics are discussed throughout Subsections I, II, and III of Section D in this report and are summarized at the following locations in the report:

- o Design - Subsection V.A
- o Procedures - Subsection V.B
- o Inspection Planning - Subsection VII.A

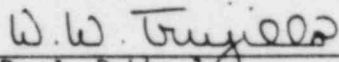
Prior to the completion of the PCVT efforts, the project initiated a major effort to solve these issues in the pipe support discipline. It is recommended that this effort be expanded to include other appropriate disciplines.

IV. Resolution of Issues

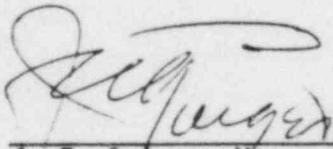
Controls are in place to ensure that all PCVT identified issues, be they deficiencies or concerns, are tracked to resolution. The PCRT will maintain a tracking matrix which will include all items, and with Steering Committee direction, will assign action items to responsible organizations to resolve the issues. The PCRT will meet on a weekly

basis to discuss status and will update the Steering Committee on a biweekly basis. No issue may be indicated as being resolved/closed without Steering Committee concurrence.

Note: All actual deficiencies will be handled in accordance with existing project procedures and appropriate deficiency documentation (e.g., NCRs, SDRs, DEFs, etc.).


R. J. Rehkugler August 8, 1985
Lead Quality Engineering
Supervisor, Pre-CAT Verification Team

APPROVED:


J. E. Geiger, Manager August 8, 1985
Nuclear Assurance Department

SECTION C

DEFICIENCIES/CONCERNS

The following is a listing of issues identified by the PCVT during the Pre-CAT verification.

Items are numbered sequentially as they appear in sub-sections I. through VIII. of Section D of this report, are briefly described, and also have the page number of their location provided to enable quick reference. The column identified as "D/C/O" indicates the type of observation made (in the PCVT's opinion), with "D" being "Deficiency", "C" being "Concern", and "O" being merely an "Observation". The "Status" column is indicative of the resolution status placed on each item by the PCVT, with "C" being "Closed", "O" being "Open", and "N/A" being applied to observations made.

It should be noted that no PCVT-identified item will be considered as being officially resolved without concurrence from the Steering Committee.

Also to be noted is that the items listed on the attached pages are meant to aid the reader only, and do not represent the sum total of each discrete PCVT observation. Any item listed could have a number of specific observations which apply to that item.

| ITEM # | DESCRIPTION | LOC. | D/C/O | STATUS |
|--------|--|------|-------|--------|
| 1. | HL&P Response to NRC IN #85-13/81-07 | I.2 | C | 0 |
| 2. | HL&P Response to NRC IEB #79-14 | I.2 | C | 0 |
| 3. | RT Procedure adequacy | I.4 | C | 0 |
| 4. | RT Procedure qualification | I.5 | D | 0 |
| 5. | Isotope traceability | I.5 | C | 0 |
| 6. | W RT film accountability/retrieval | I.5 | C | 0 |
| 7. | Informational RT techniques | I.7 | C | 0 |
| 8. | MT Procedure qualification | I.9 | D | 0 |
| 9. | MT prerequisites, satisfaction of | I.9 | O | N/A |
| 10. | MLCS - "complete" pipe support actually not installed | I.9 | C | 0 |
| 11. | QCP for pipe supports | I.11 | C | 0 |
| 12. | Pipe support specification "workability" | I.11 | C | 0 |
| 13. | Pipe support specification adequacy | I.12 | D | 0 |
| 14. | Inspection planning | I.15 | D | 0 |
| 15. | Inspection inadequacies | I.16 | D | 0 |
| 16. | Construction tampering | I.16 | D | 0 |
| 17. | Corrective action ineffectiveness | I.17 | D | 0 |
| 18. | Use of unreviewed vendor manuals | I.18 | D | 0 |
| 19. | HVAC hanger design "workability" | I.19 | C | 0 |
| 20. | Missing paint touchup | I.20 | C | 0 |
| 21. | Fireproofing removal, control | I.20 | C | 0 |
| 22. | Untimely QC Sup'v. review of QA Records | I.21 | C | 0 |
| 23. | Document Control Personnel | I.21 | C | 0 |
| 24. | Restricted use of Huck bolts - lack of criteria | I.22 | C | 0 |
| 25. | Piping - missing "V" marks on welds | I.26 | D | C |
| 26. | Fittings - marking inadequacies | I.26 | D | C |
| 27. | Piping - potential interferences | I.26 | D | C |
| 28. | Methods for selection of limited access welders | I.27 | D | 0 |
| 29. | In-process inspection | I.28 | C | 0 |
| 30. | Radial shrinkage in circumferential butt welds | I.29 | C | 0 |
| 31. | Block welding restrictions | I.30 | C | 0 |
| 32. | Arc gouge damage/related corrective actions | I.31 | D | 0 |
| 33. | Piping/welding - records deficiencies | I.32 | D | 0 |
| 34. | Piping/welding - records concern | I.32 | C | 0 |
| 35. | Piping/welding - protection | I.33 | D | 0 |
| 36. | PT Procedural, procurement issues related to family groupings and materials | I.34 | C | 0 |
| 37. | PT performance weaknesses (surface prep, temperature, lighting, hand tools) | I.35 | C | 0 |
| 38. | Inadequate interpretation of welder qualification RT film | I.36 | D | 0 |
| 39. | Retention of welder qualification RT film | I.36 | C | 0 |
| 40. | NDE Personnel qualifications/ certifications, records | I.38 | D/C | 0 |
| 41. | MT Records review (relates to #8) | I.40 | D | 0 |

| ITEM # | DESCRIPTION | LOC. | D/C/O | STATUS |
|--------|---|---------------|-------|--------|
| 42. | *Summary of pipe support/hanger-related observations | I.41, I.43 | D/C | 0 |
| 43. | Arc strike on pipe | I.46 | D | 0 |
| 44. | Questionable use of weld symbols on drawings | I.46 | C | 0 |
| 45. | Missing information on ISO drawing (2) | I.46 | D | 0 |
| 46. | Incorrect and missing design information | I.46 | D | 0 |
| 47. | Interference observations | I.46 | D | 0 |
| 48. | Incorrect pipe hanger installed | I.46 | D | 0 |
| 49. | Installation of straight run of piping without ISO-required orifice flange/plate assembly | I.46 | C | 0 |
| 50. | Pipe hanger/support observations | I.47 | C | 0 |
| 51. | Mechanical equipment maintenance deficiencies, concerns (numerous) | I.48 | D/C | 0 |
| 52. | Mechanical equipment maintenance documentation deficiencies/concerns | I.49 | D/C | 0 |
| 53. | Status 4 vendor manuals (related to #18) | I.51 | D | 0 |
| 54. | HVAC hangers/supports-welding deficiencies (configuration, size) | I.52 | D | 0 |
| 55. | HVAC hangers/supports records | I.54 | D | 0 |
| 56. | HVAC hangers/supports-procedure review results | I.55 | C | 0 |
| 57. | HVAC ducting-related observations, concerns, deficiencies | I.56 | D/C/O | 0 |
| 58. | Environmental qualification of HVAC sealer, flexible connections | I.57 | C | 0 |
| 59. | Ruskin fire dampers-testing, nonconformance control, procedure review | I.59 | D/C | 0 |
| 60. | Housekeeping, general workmanship issues - E/I & C systems | II.1 | C | 0 |
| 61. | Corrective action | II.2 | 0 | N/A |
| 62. | Inadequate wiring terminations | II.4 | D | C |
| 63. | Bypassing inspection witness points | II.4 | 0 | N/A |
| 64. | Housekeeping, protection issues - E/I & C systems | II.4 | 0 | N/A |
| 65. | Nonconformance control/hold tags | II.4 | C | C |
| 66. | Excessive use of electrical cable | II.5 | C | 0 |
| 67. | Failure to maintain traceability to acceptance status of cut and re-reeled electrical cable | II.6 | D | C |
| 68. | Attachment of nameplates to electrical equipment | II.8 | C | 0 |
| 69. | Misidentified electrical conduit | II.9 | 0 | C |
| 70. | Missing color coding, identification of flow transmitters, tubing | II.9 | 0 | C |
| 71. | Procedure "workability", inspection planning | II.10 | C | 0 |

* Specific items are addressed by pipe hanger task force with regard to observations' validity (under separate cover).

| ITEM # | DESCRIPTION | LOC. | D/C/O | STATUS |
|--------|--|-------|-------|--------|
| 72. | Loose electrical terminations | II.11 | D | 0 |
| 73. | Pale yellow colored cable conductors rather than orange as required | II.11 | C | C |
| 74. | Damaged termination lug | II.11 | D | 0 |
| 75. | Unidentified cable conductors | II.11 | D | 0 |
| 76. | Design "workability" | II.12 | C | 0 |
| 77. | Traceability of electrical support material | II.12 | O | N/A |
| 78. | Electrical separation/NRC IEN #85-11 | II.13 | C | 0 |
| 79. | *DJ Electrical system hardware-related deficiencies, concerns, observations | II.16 | D/C/O | 0 |
| 80. | EE-580 Design change interface/completion statusing | II.23 | C | 0 |
| 81. | EE-580 Design change control | II.24 | D | 0 |
| 82. | In-place protection requirements - sealing ends of electrical conductors | II.26 | C | C |
| 83. | Maintenance of 1E Batteries | II.27 | C | 0 |
| 84. | *DJ System records | II.28 | D | 0 |
| 85. | Electrical QCP "workability" | II.30 | C | 0 |
| 86. | Unverifiable compliance with procedural requirements for daily QC surveillance inspection | II.30 | C | 0 |
| 87. | *PK System records | II.31 | D | 0 |
| 88. | Cable tray hanger/support observations (unverifiable QC acceptance, damage, uninspected welds, incorrect weld configuration, galvanizing over weld splatter, rust) | II.32 | D/C | 0 |
| 89. | Electrical separation violations (2) | II.33 | D | 0 |
| 90. | Unsupported cables, unprotected Cannon plugs | II.33 | C | 0 |
| 91. | Damaged cable tray splice plate | II.33 | D | 0 |
| 92. | Misaligned holddown spring nut on cable tray | II.33 | D | 0 |
| 93. | Document control problem - electrical support | II.34 | C | 0 |
| 94. | Cable tray/raceway records deficiencies | II.35 | D | 0 |
| 95. | Cable tray/raceway procedure review | II.37 | C | 0 |
| 96. | Quantification of Cat 1 backfill receipts | III.1 | C | C |
| 97. | Calibration/checking of sieve screens | III.2 | C | 0 |
| 98. | Checking of backfill material for contamination/notification of testing agency | III.2 | C | C |
| 99. | Cat 1 backfill records review notations | III.3 | O | N/A |
| 100. | Mapping of Cat 1 backfill | III.3 | C | 0 |
| 101. | Failure to check frequency of concrete vibrators | III.7 | D | 0 |

* All DJ system-related observations, plus PK System records, are being resolved under separate cover (SDR H-098).

| ITEM # | DESCRIPTION | LOC. | D/C/O | STATUS |
|--------|--|------------------|-------|--------|
| 102. | Concrete QCP "workability" | III.8 | C | 0 |
| 103. | FSAR inaccuracy | III.9 | C | 0 |
| 104. | Expansion anchors-adequacy of current design | III.9 | C | 0 |
| 105. | Traceability/control of bolting materials; procedural controls | III.10 | C | 0 |
| 106. | Relocation controls for anchor bolts | III.11 | O | N/A |
| 107. | Anchor bolt QCP comprehensiveness/ workability | III.11 | C | 0 |
| 108. | Temporary attachments to liner plate | III.12 | C | 0 |
| 109. | Lack of coatings touchup | III.12 | C | 0 |
| 110. | Housekeeping issues | III.12 | C | 0 |
| 111. | AWS weld inspection, inspection reporting specificity | III.13 | C | 0 |
| 112. | Adequacy of two different joint configurations at same structural member | III.13 | C | 0 |
| 113. | Thermal movement affects on solidly- welded HVAC duct | III.13 | C | 0 |
| 114. | Tracking, statusing, records for structural connections changed from bolted to welded | III.14 | C | 0 |
| 115. | Inadequate control of structural steel bolting material | III.14 | D | 0 |
| 116. | Use of/replacement of galvanized bolts | III.15 | C | C |
| 117. | Missing bolts/system for installing | III.15 | D | 0 |
| 118. | Use of ASTM A307 cadium plated bolts in lieu of required A325 | III.15 | C | 0 |
| 119. | Cracked shelf angle weld | III.16 | D | C |
| 120. | Incorrect date entered on inspection report (calibration date vs. inspection date) | III.16 | C | 0 |
| 121. | Failure to apply grease to post- tensioning tendons | III.17 | D | 0 |
| 122. | Failure to check buttonheads for eccentricity | III.17 | D | 0 |
| 123. | Observed practices in tendon gallery | III.18 | C | 0 |
| 124. | Nonconformance control related to post-tensioning | III.18 | C | C |
| 125. | Availability of post-tensioning records from supplier | III.19 | C | 0 |
| 126. | Untimely submittal of records to STP RMS | III.20 | C | 0 |
| 127. | No QCP which addresses QC involvement in certification of coatings personnel | III.21 III.44 | C | 0 |
| 128. | No system in place to determine completion of an area or room (coatings) | III.21 III.45 | C | 0 |
| 129. | No system in place to ensure that coatings touchup needs are tracked, accomplished, and verified | III.21 | C | 0 |

| <u>ITEM #</u> | <u>DESCRIPTION</u> | <u>LOC.</u> | <u>D/C/O</u> | <u>STATUS</u> |
|---------------|--|-------------|--------------|---------------|
| 130. | Cat 1 Backfill QCP review results | III.23 | C | 0 |
| 131. | Concrete records - filing methods | III.25 | C | 0 |
| 132. | Cadweld as-built records | III.26 | D | 0 |
| 133. | Deletion of testing requirements for non-shrink grout | III.27 | D | 0 |
| 134. | Concrete QCP review results | III.28 | C | 0 |
| 135. | Design adequacy for Hilti Bolts | III.33 | C | 0 |
| 136. | Expansion anchors QCP review results | III.36 | C | 0 |
| 137. | Loose bolts | III.37 | D | C |
| 138. | Structural steel QCP review results | III.39 | C | 0 |
| 139. | Coatings QCP review results | III.42 | C | 0 |
| 140. | Material traceability, control, and identification issues | IV.1 | D/C | 0 |
| 141. | Material storage, staging | IV.2 | D | 0 |
| 142. | In-place protection | IV.3 | D | 0 |
| 143. | Maintenance | IV.3 | D | 0 |
| 144. | Housekeeping | IV.3 | D | 0 |
| 145. | Design adequacy, control, and workability | V.1 | D/C | 0 |
| 146. | Procedural adequacy, workability | V.3 | C | 0 |
| 147. | Document control | V.4 | D/C | 0 |
| 148. | Nonconformance Control | VI.1 | D/C | 0 |
| 149. | Corrective Action | VI.5 | D/C/O | 0 |
| 150. | Inspection - planning, performance, reporting | VII.1 | D/C | 0 |
| 151. | Records - retrievability, adequacy, review | VIII.1 | D/C/O | 0 |

I. Mechanical/Nondestructive Examination (NDE)

A. Piping/Welding

A review of activities and documentation related to piping and welding activities was accomplished. Items evaluated during this review included, among others, items' orientation/configuration, surface preparation (ISI welds), material verification, purge dam control, weld adequacy (visual examination), physical clearances, limited access welding, equipment protection, and records.

The applicable specification utilized during this review was 5A010PS002, revision 6 (including all applicable changes). Specific documents utilized are as referenced at their point of applicability.

As the scope of the PCVT review in the area of piping/welding was quite broad in nature, no effort was made to quantify the results and provide a percentage of accept/reject rates. Therefore, all specific hardware-related and procedural observations are included in the Exhibits as discussed below.

Exhibit 1 contains a listing of satisfactory observations made.

Exhibit 2 contains a listing of unsatisfactory conditions observed for which corrective actions have already been initiated by the Engineer or Constructor.

Exhibit 3 contains a summary of observations made regarding limited access welding and welder assignment, plus in-process inspections. The PCVT considers the subject regarding limited access welding to be indicative of a deficiency. A response has been received from the PCRT which partially addresses the conditions identified, and this response is also discussed in Exhibit 3.

Exhibit 4 discusses an observed condition of radial shrinkage in a circumferential butt weld, along with a response on the subject by HL&P Engineering and the PCVT's final conclusion on the matter. Also provided are PCVT recommendations regarding actions to adequately address the issue.

Exhibit 5 discusses an observed instance of apparent "block welding" being performed. Block welding is a practice where, rather than making circumferential deposits of weld metal into the joint resulting in gradual buildup the whole way around the weld, individual areas (e.g. - quadrants) are welded in their entirety prior to moving on to the next area. This practice can create an uneven distribution of heat in the joint inducing undesirable stresses, and is generally unaccepted.

Exhibit 6 discusses observations regarding arc gouge damage to installed items by welding leads, and a PCVT determination that, to date, corrective actions to prevent this occurrence appear to have been ineffective.

Exhibit 7 discusses documentation (record) deficiencies observed for eight (8) field welds (100% of the records review sample selected).

Exhibit 8 discusses protection deficiencies which were observed.

One issue observed by the PCVT was with regard to an HL&P response to an NRC Information Notice (IN). IN #85-13 was issued on February 21, 1985, to address operating problems encountered in the industry which were attributable to the use of water soluble purge dams during welding. The problems dealt with excessive scram times identified during surveillance testing of the control rod drive systems, and were attributed to clogged inner filters in the control rod drive mechanisms due to undissolved fibers from purge dam material (Dissolvo).

A copy of this IN was distributed to the project (HL&P) on February 26, 1985, by HL&P Licensing via the Operating Experience Report Program, with an indication that no action was required. That determination was made based on a previous response to an earlier IN (#81-07) which stated that the use of water soluble purge dams was disallowed on STP per Welding Engineering specification WES-13.

The response to IN #81-07 applied to the previous constructor, and a review of current practice indicated that the response does not accurately reflect site activities. Water soluble purge dams are, in fact, used on STP, but their use is controlled (note that one (1) of the satisfactory verifications on Exhibit 1 is control of purge dam material) and restricted to use on non-NSSS systems. CSP-84, revision 4, was reviewed, and attachment 4.05.1.d., of that procedure allows use of water soluble purge dams ("Dissolve" WLD-35 and WLD-60, with "Dissolve" adhesive tape).

It is recommended that current practices be reevaluated, and that, as a minimum, the original response to IN #81-07 be revised to reflect actual practice at STP.

Another HL&P response to an NRC correspondence (IE Bulletin #79-14) was evaluated prior to the Pre-CAT Verification effort. This has been discussed with HL&P Licensing, and it was indicated that the response would be modified. However, the matter will be rediscussed in this report to ensure that the revision, if not already in process or complete, will be tracked to completion.

Briefly, IEB #79-14 deals with a required inspection (e.g. - "as-built" walkdown) of installed piping systems to establish actual configuration and comparatively assess the "as-built" to the existing design, plus performing any needed reanalyses/rework to ensure that the "as-built" configuration and design are adequate and alike.

In response to #79-14 (ST-HL-AE-386 dated October 30, 1979), it was stated in part that, "... such an inspection will not be necessary in the future due to ... procedures employed ... The changes, be ... made a part of the design drawings before such changes can be made. This system provides for a continuous updating ... such that at any point in time, the as-built configuration and ... drawings are consistent."

While this response may have been accurate at that time, it is not at the present time. There are documents in use at present which can depict an as-built configuration other than that which is designed which may never be incorporated into the parent design document (e.g. - N/I FCRs, "use-as-is" NCRs). It could be very difficult to assemble all of these documents to do a 79-14 verification by design analysis. Also, it would appear that an accurate "as-built" analysis would have to consider applicable inspection records. Based on PCVT observations, it is felt that the current methods of inspection reporting (which are very general in nature) would not necessarily provide the needed detail with regard to specific as-built information/configuration.

In any event, the PCVT is aware of the fact that the project is currently preparing to perform a physical 79-14 walkdown and subsequent design conformance to the as-built. It is recommended that the project's response to IEB #79-14, if it has not been already, be revised to reflect current intentions as soon as possible.

B. Nondestructive Examination (NDE)

1. Penetrant Testing (PT)

The PCVT accomplished a review of the applicable procedure utilized to perform PT examinations on STP, and witnessed the performance of nine (9) PT examinations on socket welds to assess procedural compliance and the adequacy of testing observed. The PCVT also reviewed the qualification/certification records for two (2) NDE personnel. The following is a summary of observations made during these reviews.

The applicable procedure which was reviewed was NDE-006-1, revision 1, with addendum #5. A number of comments were generated which resulted in a concern that, although no problems have been observed in actual practice, the procedural content creates potential for deficiency. Detailed comments are as found on Exhibit 9.

A review of issues related to PT materials' family grouping and test reports (for halogen and sulphur content) was accomplished as part of investigations related to suspected procedural problems, and these results are also included on Exhibit 9.

Witnessing of the nine PT examinations resulted in a number of observations which, while they will not be classified as deficiencies at this time, indicate apparent weaknesses with regard to NDE personnel cognizance of the applicable requirements. These observations are detailed on Exhibit 10. It should be noted that the only reason why these observations were not classified as being deficiencies was that the welds examined were ultimately determined to be acceptable; therefore, the examiners did not fail to detect any rejectable indications.

Details regarding the review results of the NDE personnel qualification/certification records are found on Exhibit 12.

The PCVT had concluded that, although no deficiencies would be cited at the time of Interim Report #4, any or all of the observations made could be construed as being deficiencies, and requested a response by June 28, 1985. No response was received, and these items should all be continued as open issues requiring resolution.

2. Radiographic Testing (RT)

The PCVT accomplished a review of the applicable procedure utilized to perform RT examinations on STP. Radiographs of eleven (11) sets of RT films (and reader sheets) for field welds and twelve (12) welder qualification test coupons were also reviewed, as well as the qualification records for seven (7) RT examiners. The following is a summary of the observations made during these reviews.

The applicable procedure reviewed is NDE-002-1, revision 4, with addendum #1. There were no problems identified during this review, but two (2) areas of concern were raised, and are as follow:

- The procedure has no provisions for source size certification, either from the manufacturer or by the use of the pinhole method.
- The minimum/maximum density limitations in the procedure are different than those allowed by the ASME Code.

| <u>NDE-002-1</u> | <u>ASME Code</u> |
|---------------------------|---|
| 3.8 maximum density - - - | 4.0 maximum density |
| 2.0 minimum density - - - | 1.8 minimum density (single film with X-ray source) |

According to interim PCRT feedback, procedural changes are to be accomplished, and the PCVT requested that it be advised of their completion (or schedule) by June 28, 1985. This did not concur, and the PCVT considers this to be a remaining open item.

Review of the 11 field welds' RT film resulted in a determination that the welds were of acceptable quality. The affected welds are:

- Line SI-1118, field weld (FW) #1, 4, 13, 13A and 14
- Line CC-1097, FW #30, 31 and 32
- Line CC-1112, FW #3
- Line CC-1104, FW #5
- Line CV-1019, FW #FS1690

During this review of field weld RT films, however, a number of issues were raised which require resolution or attention. These are as follow.

a. Procedure Qualification

The ASME Code requires that the RT procedure be proven to be satisfactory by actual demonstration to the Authorized Nuclear Inspector (ANI) when Iridium 192 (IR192) isotopes are utilized on steel with a minimum thickness of less than 0.75 inches. A review of the RT procedure qualification film and RT reports revealed the following:

- The step wedge was not traceable to the qualification radiograph.
- The RT report was not completely filled out.
- The thicknesses where the penetrameters were placed on the step wedge were not identified.
- The minimum thickness qualified was .250", whereas thicknesses as low as .216" were observed as having been radiographed.

The PCVT advised (in Interim Report #5) that it felt that a procedure requalification was needed, and PCRT feedback indicated that this had occurred; and that ANI approval was pending. Although the PCVT took no further action, it recommends that the item be followed by the project to conclusion.

b. Isotope Traceability

ESI maintains the manufacturer's certification of effective source size for IR192 isotopes. However, it was observed that, for determination of geometric unsharpness values, RT reports only depict the recording of source size in inches. No reference is made to the identification (e.g. - serial number) of the camera used. This would allow for traceability to the documentation applicable to each isotope used.

Note: Concerning radiation safety, it is important to be able to discern where an isotope has been stored, and especially where any particular isotope has been used. In the event that a leak is detected by a leak wipe test, an evaluation must be made with regard to potential consequences to personnel due to radiation exposure. The PCVT feels that the recording of the camera serial number, in this regard, is essential to ensure traceability.

The PCVT recommends that RT reporting methods be modified to provide for the recording of camera serial numbers and actual effective source size.

Although time constraints precluded a PCVT review of RT film representing NSSS equipment provided to STP by Westinghouse (W), a preliminary review of contractual requirements for W submittal of film resulted in the identification of a concern.

According to the existing NSSS contract, radiographs of safety related and selected major components are to be retained as specified by the ASME Code by W and their subcontractors. At a point in time after plant acceptance, and as agreed to in the contract, the RT film will be retrieved from storage by W and forwarded to STP for permanent retention.

The PCVT does not necessarily feel that the agreement of obtaining the radiographs "at a point in time after plant acceptance" may have been the most prudent of decisions when considering some of the postulated ramifications which could arise. Examples are:

- STP Project Quality Assurance Plan (PQAP), revision 1, section 17, 17.1, in describing the STP QA records program, states in part that, "Basic requirements will be established for . . . other contractors and suppliers . . ." (Note that W is not specifically mentioned.)
 " . . . to ensure that records generated are identifiable, retrievable, and meet . . . 10CFR50 and ANSI N45.2.9 as endorsed by Regulatory Guide 1.88."

As W and its subcontractors are tasked with the retention of QA records (RT film) until turnover at some point in time, controls should be in place to ensure that records are being properly retained. It is not clear that W has imposed the requirements of ANSI N45.2.9 on its contractors. In any event, ongoing evaluations (e.g. - audits) are needed to ensure that STP records are being adequately maintained. Aside from the extra costs of this, the possibility exists that:

- 1) STP records may not be adequately maintained, and could be subject to damage or destruction without the project's cognizance.
- 2) W may not be adequately monitoring maintenance of STP records being retained by some supplier whose scope of supply is complete excepting the records, and who may, in fact, be out of business by the time a "point in time after the plant acceptance" arrives.

- The above notwithstanding, it is not immediately clear how STP (or W for that matter) has established accountability for all RT films which are required to be forwarded. It should be noted that a recent bulk shipment of RT film was received by STP, and W personnel are currently on site apparently sorting through the film to identify it.
- Even assuming that all required records are accounted for and are being adequately maintained by others, it would appear to be favorable to STP if the records were on site and available for ready retrieval. The possibility exists that a problem or question could arise which could only be resolved through review of the RT film. The project could be susceptible to criticism for untimely retrieval caused by delays due to a multi-step process of requesting, locating and obtaining the film.

Based on the above, it is recommended that STP reevaluate its current contractual agreements with W; that actions be taken to obtain a comprehensive listing of all STP radiographs which are being retained by W and its subcontractors; and that arrangements be made for a planned and immediate transfer of this film to STP for on-site retention.

Another concern identified by the PCVT during review of RT-related activities deals with the observed practice of "information only" radiography. The PCVT has concluded that the practice as is currently employed is not of any particular benefit to the project, and, in fact, may actually be a detriment. The following conditions were observed:

- RT examination of in-process welding is apparently performed without using required Code or procedural techniques. Penetrameters, location markers, RT reports, or density limitations are not considered for these examinations.

The PCVT feels that, while the practice of making "info only" examinations is certainly warranted under some circumstances (e.g. - weld joints of large thickness where in-process RT could eliminate the need for costly excavations/repair at a later date), it does not seem that it would be of any value unless accomplished using the same techniques and considerations as those applied to a completed weld. It should be noted that PCVT interviews with various individuals have confirmed this. It has been stated that there have been instances where the "info" shot showed no indications, and a subsequent final shot, with proper density and sensitivity, revealed rejectable indications. In these instances, "info only" RT is of no use. In a PCRT response to another issue regarding

selection of personnel for limited access welding (reference Exhibit 3), ECI has confirmed the PCVT concern. In that response, ECI states that " . . . in-process radiographs are . . . not shot with penetrameters . . . often are not acceptable to satisfactorily interpret . . . Quite often areas are rejected in-process that are not rejectable in the final code quality radiography (no repair has been made) . . . rejectable areas identified in-process do not necessarily indicate poor quality workmanship . . ."

With regard to the stated concerns about observed "info only" RT practices, it is recommended that these examinations be either 1) performed in accordance with existing procedural controls for RT of production welds, or 2) be discontinued.

The 12 radiographs for welder qualifications reviewed are as follows:

| | |
|-----------|-----------|
| PQT #2620 | PQT #3497 |
| PQT #2623 | PQT #3494 |
| PQT #2650 | PQT #3537 |
| PQT #2711 | PQT #3664 |
| PQT #2671 | PQT #4256 |
| PQT #3471 | PQT #4258 |

The PCVT observed one (1) deficiency and one (1) concern during this review. Details are as found on Exhibit 11. Response to these issues was requested by June 28, 1985. A response to the area of concern was received, but response to the deficiency was not. The response received is also discussed on Exhibit 11. Both of these issues are still considered to be open items requiring resolution.

With the exception of one (1) adverse observation, review of personnel qualifications for the 7 RT examiners resulted in a determination that the records are in order. A response to the exception (as discussed on Exhibit 12) was requested by June 28, but none was received. The PCVT considers the condition to be due to failure to forward required records to STP-RMS in a timely manner.

3. Magnetic Particle Examination (MT)

A review was performed of activities and documents (records) related to the MT examination process. This review consisted of the actual witnessing of examination activities, review of nineteen (19) examination report packages, and verification that NDE personnel were appropriately certified at the time of examinations being performed (eight (8) examiners verified). The following is an overview of PCVT verification results for this NDE discipline.

There were one (1) deficiency and one (1) area of concern identified during this review, as will be discussed.

Two (2) in-process MT examinations were witnessed by the PCVT. Affected items were 10" and 14" diameter field welds, identified as follows:

- Line #WA3 CC1215, FW 0010-C1 (drawing #3C369CC407, sheet 1, revision 3)
- Line #WA3 CC1217, FW 0017-C1 (drawing #4C369CC407, sheet 17, revision 0)

Results of these examinations were documented on MT reports #MT-1330 and 1331.

Details regarding the area of deficiency identified are as follow, and are related to qualification parameters of the applicable MT procedure (NDE-007, revision 1). Review of the 19 records packages (reference Exhibit 13) indicated that, in eleven (11) of 19 reports reviewed, the maximum prod spacing was identified as being six inches. The PCVT observed that, although NDE-007, revision 1, allows use of a 3" - 6" prod spacing, the procedure was only qualified at a prod spacing of 5".

Technically, therefore, the qualified capability of the process as depicted in the procedure to detect anticipated discontinuities is at a maximum prod spacing of 5", not 6" as is being practiced. Process capability at 6" spacing has not been demonstrated, and must therefore be considered to be deficient.

The area of concern regards observed shortcomings in the NDE process, and is as follows. Construction superintendents who are responsible for requesting NDE are apparently not verifying that the weld identification numbers have been Vibro-etched into the pipe prior to technicians performing the test. When technicians reach the weldment and find no weld identification number, excessive time is lost in tracking down area supervision to have craft personnel etch the required numbers into the pipe before the test can be performed. It is recommended that construction supervision provide additional attention to the prerequisites so that the NDE process can be accomplished in a more timely manner.

C. Pipe Supports/Hangers

A total of twenty seven (27) installations were selected from the MLCS for detailed verification. Of these (27), one (1) was found to be not installed, although the MLCS indicated it to be installed and QC accepted. Of the twenty six (26) which received a detailed verification, twenty one (21) were determined to be rejectable due to one or more deficient attributes. These results indicated a rejectable rate of nearly eighty one (81) percent. Nineteen (19) of the (21) installations had already been accepted by ESI QC.

In addition to the (26) detailed verifications performed, a general walkdown-type verification was made on five (5) other installations to check for generic-type conditions which were being identified. All of these were determined to be rejectable. Four (4) of the (5) had been accepted by ESI QC.

All of the installations checked were on Unit I "CC" and "SI" piping, and a detailed summary of observations is provided on Exhibit 15. A number of other observations were made which do not relate to hanger/pipe support installation, but which nevertheless need to be addressed. These are provided on Exhibit 16. Exhibit 14 provides a breakdown of these observations by the type and quantity of problems. The two main areas of problem for which no criteria exist are cotter pins - related and interference. Discussions with the supplier indicate that the criteria will be provided for those attributes as they relate to hangers themselves. Regarding inter-system interferences, note that STP has no criteria for checking this.

It should be noted that, as a result of HL&P QC Effectiveness Inspections (EI), HL&P QA generated deficiency documentation (e.g. - SDR, DEF) which covers conditions similar to those observed by the PCVT. PCVT results were included with the EI results. As a result of these actions, a task force was formed to address the causes of the conditions (plus the specific validity of each), and to develop and implement a plan for investigative, remedial, and recurrence control as determined to be appropriate. These task force efforts are as yet incomplete, but to date, activities have included a specific reverification of each item listed on Exhibit 15. Some have been invalidated and some have been confirmed. In numerous instances, it was determined that many of the attributes found to be deficient did not have criteria on STP by which their adequacy could be verified.

In any event, efforts are in place to resolve each item identified in Exhibit 15, and will be available for review under separate cover.

In addition to the hardware-related verifications, the PCVT assessed the possible causes of the conditions observed and has concluded that the following, either in combination or singularly, are the most likely factors which resulted in the high deficiency rate observed: inadequacies with regard to design and procedures; excessive changes to design and procedures; inadequate construction (possibly caused by inadequate personnel training and/or the fact that installations are made according to supervisory direction and not by actual crafts' use of applicable drawings, specs., procedures, etc.); inadequate inspection planning and implementation; and unauthorized modifications to completed installations. More detailed comments regarding these possible causes follow.

1. Procedures, Design

In order for the Pre-CAT mechanical/NDE QAE to interpret the applicable requirements and develop a comprehensive checklist for the Pre-CAT verification, approximately (27) different documents (listed) were reviewed, taking almost two full work weeks to accomplish. These documents included, but were not limited to:

- a. Specifications (w/ applicable changes)
3A010SS0030
5L340JS1002
5A010PS002
5L209PS1003
4L360JS1000
- b. Supplier Procedures (NPSI)
(12) approximately 1" thick each
(1) catalogue, approximately 1½" thick
MIC printout, approximately 3" thick
- c. Contractor Procedures (ECI, ESI)
CSP-7
QCP-10.12
- d. Codes
ASME Section III, NF
ASME Section III, NA
AWS D1.1
MSS SP58 Not available on site; had to be
MSS SP69 ordered from BPC HAO Library
- e. Other
Full history, approximately 3/4" thick

Some specific observations made with regard to procedural and design adequacy, accuracy and "workability" are as follows:

- f. Procedure #QCP-10.12, revision 3, with PCR numbers 1 through 5 consists of sixty one (61) pages, sixteen (16) of which are applicable revisions. This procedure makes reference to numerous other procedures and specifications to obtain dimensional, location and other inspection acceptance criteria.
- g. The procedure does not provide the basic criteria to inspect a hanger/support installation. Most needed criteria are contained in numerous other references (e.g. - specifications, contractor procedures, supplier procedures, supplier catalogues, etc.), which may not be readily available to an inspector. Even if available, it would take a considerable amount of time to extract all applicable requirements.
- h. In determining the applicable requirements to perform an inspection, reference must be made to, among other documents, specification #5L340JS1002, revision 6, SCN numbers 18 and 19 which consist of (21) pages of revisions which substantially effect major design elements such as torquing, clearances, tolerances, weld size decrease/increase, allowable deviations, alternatives,

exceptions, relocations, material substitutions/restrictions, etc. These revisions make it very difficult to discern what is really required, especially in considering the allowable deviations, exceptions, relocations, etc.

This same specification provides welding inspection criteria which is apparently contradictory to, or in violation of, the applicable welding acceptance criteria as found in ASME Code Section III, Subsection NF. Examples are as follows:

- 1) Specification paragraph 5.1.5.4.5 states that, "There shall be no cracks or linear indications in the weld exceeding 1/16". This is contradictory to Code requirements which prohibit cracks of any length.

Feedback from HL&P Engineering on this issue indicates concurrence that the specification requires revision. In that response, HL&P stated that discussions with ECI indicated that, although the specification acceptance criteria allowed acceptance of cracked welds, none have been accepted by QC. Engineering's conclusion, therefore, was that the specification deficiency did not affect any hardware.

While this is most likely true, the PCVT wishes to advise the project that it is entirely possible that the project could be required to produce evidence to substantiate the statement that no cracked welds were accepted, especially in light of the specification acceptance criteria indicating that cracks up to 1/16" were permissible.

- 2) Specification paragraph 5.1.5.4.2 allows the fillet leg dimension to underrun nominal fillet size by not more than 1/16" over 10% of the weld length, unless an alternate undersize tolerance is specified by vendor installation instructions. This is contradictory to ASME III, Article K1000, which indicates that tolerances for undersize welds are not permissible.

Response from HL&P Engineering on this issue indicates that Article K1000 is nonmandatory, and that the requirements of NF-4427-1983 apply; also, that the specification should be revised to exactly reflect the Code requirements (2" or 10%, whichever is less).

The project is reminded that this 1983 Code version is not indicated as being applicable to the specification, and that, if its criteria are to be used, the specification should indicate its applicability.

- 3) Specification paragraph 5.1.5.4 was revised by SCN #19, item 22, to include reference to AWS D1.1, Figure C8.8.5, further contradicting and/or obscuring the applicable acceptance criteria for NF welds.

HL&P Engineering input into this matter indicates that this AWS criteria was added to cover attributes not addressed in the Code - namely, weld deposits on opposite sides of a common plane.

While the PCVT considers this to be acceptable, it is suggested that this type of information might be more easily understood by construction and QC personnel if it were provided by weld symbols on applicable drawings.

A concern regarding specification #JS1002 was also identified with regard to the installation of Mechanical Shock Arrestors (MSA).

- 4) Specification paragraph 5.1.1.19 allowed re-orientation of support members with provisions as described in paragraphs A through D, one of which was that changes be documented (excepting equal - leg angle iron). MSAs are excepted from these provisions. Paragraph 5.1.3.6 allows installation of MSAs with the forward adapter either toward or away from the pipe, regardless of the orientation shown on the drawing.

There do not appear to be any requirements to document these changes should they occur. Also, it seems that a reversal of an MSA's designated orientation could compromise its ability to arrest movement in a given direction unless the MSA's designated capacity is equal in each direction of anticipated movement.

Response from HL&P Engineering on this issue included sufficient detail to substantiate as to why reversal was acceptable, but did not address the question regarding the absence of requirements to document the change. This is considered to be a remaining open item.

Another area of question with regard to specification adequacy/workability deals with that of thread engagement, and was raised after the review of a related problem identified by the NRC Technical Review Team at Comanche Peak.

- 5) 4L360JS1000 requires that, "All threaded support elements shall have adequate thread engagement in accordance with ANSI B1.1-1974."

The question raised is with regard to the definition of "adequate" (reference paragraph C.5, Appendix C of ANSI B1.1) as it relates to inspectability; as the length of thread engagement is determined by calculations based on the unit tensile strength of external versus internal threaded material, and apparently does not have to be "full" engagement in order to comply with the applicable standard.

It appears as if an inspector would have to have access to, and the expertise to evaluate, the applicable calculations in order to determine the acceptance criteria for a threaded connection.

Response from HL&P Engineering on this issue included a quantity of technical information from Anchor-Darling (not our support/hanger supplier, NPSI) regarding thread engagement. The response does not address the issue at hand - usable acceptance criteria to an installer or inspector. The PCVT feels that the project is lacking with regard to having available a set of concise, workable instructions which would provide personnel with a clear understanding of acceptable thread engagement attributes for all types of thread connections (e.g. - flush, one thread past flush, two threads past, etc.).

- i. QCP-10.12 makes reference to procedure #CSP-7 (reviewed at revision 4), paragraph 8.01.03 indicating that Field Engineering accomplishes a check for physical clearance of supports with other systems. A hindrance to satisfactory accomplishment of these checks would appear to be a lack of defined interference criteria (INPO finding) with which the check would be made. There do not seem to be any controls in place to ensure that these checks are made or to ensure that all interferences get identified.

Additionally, it appears that the installation specification (#5L340JS1002, revision 6) has been developed in disregard of the need for interference considerations. Paragraph 5.1.1.3 of the specification states that, "Dimensions on pipe support drawings showing locations of piping with respect to building structures, other pipe, nearby equipment, or plant coordinate systems are for reference only." Accordingly, it should be noted that Pre-CAT reviews of inspection records indicate that these dimensions are not being checked by QC.

- j. QCP-10.12 (with applicable changes) does not provide criteria for, nor does it require documentation of QC verification of, the following attributes:
 - 1) Remaining gap after the removal of spacer/washer from a rear bracket.

- 2) Bearing spacer/washer installation at the clamp end.
- 3) Plus or minus 5 degree angle (inspection checklist only calls out an "orientation" check).
- 4) Interference or freedom of movement between strut paddles and rear bracket and clamp spacer.
- 5) Cotter pin installation or size, or damage checks.
- 6) Load pin orientation, or damage checks.
- 7) Interference with other systems, structures, etc. (reference lack of criteria)

It should be noted that these apparent omissions cover attributes which have been found to be deficient during the hardware verification; also, that these are generic-type deficiencies which have been identified by the NRC CAT Teams at six (6) other nuclear projects.

2. Construction

As it is understood by the PCVT, ECI Field Engineering is tasked with the interpretation of applicable design and installation requirements, and with providing them to ECI Construction so that an installation can be made. Assuming that this occurs satisfactorily (the design related questions notwithstanding), and that Construction has the required information to do the job, and considering the nearly 81% rejectable rate which was observed in the plant, it must then be concluded that Construction's implementation of its responsibilities has been inadequate in many respects. The causes could be one or a combination of any conditions which were observed by the PCVT during its verification activities which included interviews with several craft personnel.

There have been statements made regarding the adequacy of training being provided to craft personnel. Also, it appears as if the personnel making an installation do not use the applicable drawings and procedures. Rather, they make installations based upon direction from the craft foreman who has the drawings and procedures. Another cause would be an observed attitude that QC would inspect quality into work rather than Construction assuming responsibility for the adequacy of work being performed.

3. Inspection Planning/Inspection

a. Inspection Planning

STP PQAP, Section 10, revision 2, paragraph 10.3 requires in part that, "Inspection planning identifies characteristics, methods and acceptance criteria . . . Inspection procedures

include all required inspection operations defined by the specifications, drawings, codes and standards. All required procedures, specifications, and drawings are made available to the inspector prior to the performance of an inspection . . . This inspection program includes inspection procedures, instructions or checklists which provide the following:
 Identification of characteristics and activities . . .
 description of the method of inspection . . . Acceptance and rejection criteria . . . "

Based upon observations and interviews made by the PCVT, it appears as if the actual practices being employed to satisfy these PQAP requirements are not producing efficient or effective results.

The observed practice is that the Construction craft supervisor will have the applicable drawings, FCRs, etc. to do an installation, but that the only information provided to the inspector when notification for inspection is made is the identification of the item to be inspected. The inspector must then accomplish whatever research is needed in order to do the inspection. As the procedures do not actually contain the accept/reject criteria, the inspector must also interpret and determine the applicable criteria against which the installation must be inspected. The inspection is then performed. (For others' observations regarding the excessive amounts of time expended by QC inspectors in preparing for an inspection, refer to 1985 INPO finding #CC.4-1.)

The PCVT does not feel that the practice of having the QC individual accomplish inspection planning is prudent, nor that it meets the intent of the STP Inspection Program as previously paraphrased.

b. Inspection

There are instances of observed deficiency where the inspector failed to identify problems in the installation which cannot be attributed to unclear or complicated criteria which must be extracted. These must be attributed solely to personnel error.

4. Construction Tampering

A number of the deficiencies observed in QC accepted installations could be attributed to Construction tampering with completed installations. Types of deficiencies which could be attributed to this are missing cotter pins, missing lock nuts, use of wire in place of cotter pins, etc. While these attributes could have been acceptable at the time of QC inspection, the parts could have been removed afterward for use elsewhere.

In this regard, the PCVT offered a recommendation which could halt or prevent this type of occurrence. It was suggested that an identification system be developed and implemented whereby an installation, when accepted by QC, receives a tag signifying its status. All personnel on site should be advised that under no circumstance shall an item tagged in this manner be tampered with or worked on in any way unless appropriate work-order type documentation is on hand to authorize the activity. Any violations of this would meet with swift and severe disciplinary action (e.g. - termination).

The PCVT reviewed records packages for three (3) support/hanger installations (most records for completed installations have yet to be turned over to STP-RMS). Questions/anomalies were identified with each package reviewed and are detailed on Exhibit 17. A response to these was requested by June 28, but was not provided. Therefore, the PCVT considers these items to be remaining open.

D. Mechanical Equipment

A review of mechanical equipment was performed. The review was limited in scope to cover in-place storage and maintenance activities only.

Documents utilized during this review included, but were not limited to, the following:

- Specifications (including all applicable changes)
5A300GS1002, revision 6

- Procedures (including all applicable changes)
CSP-32, revision 5
QCP-13.1, revision 6

- Correspondence
ST-HL-AE-1198 dated February 26, 1985 (HL&P Interim Response to NRC Generic Letter 83-28)
ST-YB-HL-2008 dated October 27, 1982 (Control of Vendor Manuals)

Exhibit 18 details the equipment reviewed (and related documentation), along with PCVT observations. As a general synopsis, the PCVT feels that the protection and maintenance being afforded mechanical equipment (and related documentation) are lacking.

The issue of in-place protection has already been identified by the PCVT, and is documented on SDR H-097, so no further action specific to mechanical equipment is needed as the SDR addresses generic implications.

The project is already aware of generic problems regarding inadequate maintenance (as per a Response Team representative, there have been over 1000 maintenance-related deficiency documents issued in the past year), and the PCVT feels that to date, corrective actions to remedy the situation have been ineffective.

Another problem identified by the PCVT was with regard to the use of unapproved vendor manuals (Status 4) for the formulation of maintenance requirements. In correspondence ST-YB-HL-2008 dated October 27, 1982, BEC advised HL&P that, "Bechtel intends to process all vendor manuals . . . in accordance with" (EDP) "4.58, Specifying and Reviewing Supplier . . . Documentation . . .", and further stated that, "These procedures insure that manuals and revisions will be reviewed for technical adequacy . . .".

Contrary to these statements, and although EDP-4.58 is indeed the procedure used to process vendor manuals, the PCVT observed that, of the ten (10) vendor manuals reviewed during this effort, six (6) were in a Status 4, which indicated that BEC Engineering passed them through the system without a review for technical adequacy. A listing of vendor manuals used during this review is as found in Exhibit 19.

The issue of technical adequacy aside, the PCVT observed that the suppliers' maintenance instructions as found in the manuals are not always being followed (refer to Exhibit 18).

The PCVT has been made aware of the fact that the project is in the process of establishing a program for equipment maintenance which is also designed to address the issues of NRC Generic Letter 83-28. A copy of a draft proposal on this subject (authorized by the HL&P STP Compliance Group) was reviewed. This review indicated that the proposal includes many commitments for the administrative control of a planned maintenance program, including usage of vendor manuals which have been determined to be technically adequate. The PCVT feels, however, that the proposal does not appear to address any immediate actions to preclude damage or further deterioration to stored or installed equipment. Based on that conclusion, the following recommendations are offered for consideration:

- Categorize equipment which is required for startup, and that which has been stored or installed over the longest period of time (e.g - having the greatest potential for existing damage or deterioration).
- Based on priorities as established above, implement an inspection program by qualified individuals to identify obvious deficiencies and equipment which is in need of immediate attention to prevent damage/deterioration (issuing appropriate documentation).
- Implement remedial actions to correct obvious deficiencies pending finalization and implementation of the STP program.

E. Heating, Ventilating and Air Conditioning (HVAC)

1. Hangers/Supports

A review was performed of specifications, procedures, field installations, QC inspections, and documentation (records) related to HVAC hangers/supports. Documents utilized during this review included, but were not limited to, the following:

Specifications (including all applicable changes)
5V279VS1003, revision 4
3V279VS1000, revision 7

Drawings (including all applicable changes)
5V010M29500, revision 2
5V010M29XXX series

Procedures (including all applicable changes)
QCP-10.21, revision 4
QCP-10.7, revision 5
QCP-9.5, revision 5

The following is a summary of PCVT observations during this review.

A total of eighty-two (82) QC-accepted hanger/support installations were physically reviewed in the Unit 1 RCB, FHB and EAB. Attributes verified during this review included dimensional accuracy, configuration, welding, etc. Of the 82 installations reviewed, seventeen (17), or approximately twenty-one percent (21%), were found to be deficient in one regard or another. Details for each of these 17 are as found in Exhibit 20, but a general breakdown is as follows.

Configuration problems accounted for two (2) of the deficient installations. One (1) installation was identified as having an undersize weld. Fifteen (15) supports were observed as having oversize welds.

With regard to oversize welds (and as also discussed in the summary on Structural Steel), the PCVT recognizes that the observed conditions do not, in all likelihood, represent a problem as far as the structural integrity of the installation is concerned. They do, however represent conditions which are not in accordance with applicable design requirements, which were accepted by QC. The PCVT feels that QC may be taking the unassigned license to consider these conditions as being "better than", and as a result, is accepting technically nonconforming conditions.

One (1) observation made during PCVT preparation and performance of reviews of this commodity was that a fairly substantial amount of research was required in order to accomplish a review of an installation, and this was considered to be cumbersome and ineffective. Once a sample for the review had been selected, it was necessary to utilize a cross-reference list in order to identify and obtain applicable BEC drawings and Intermech drawings and cutsheets (which are used to perform the installations and inspections). After obtaining the required documentation and beginning the reviews, the PCVT observed that a large quantity of hanger configuration "options" had been approved by the designer. Many installations which were initially determined to be of an unacceptable configuration were

ultimately determined to be acceptable after PCVT escorts pointed out where the observed deviations had already been covered by an allowable option/variation. The PCVT feels that the "paper trail" which must be followed in order to obtain and extract the needed information to do an inspection, combined with the large amount of deviations from design which are permitted, can make it difficult and confusing for a responsible QC individual to extract the applicable acceptance criteria which is needed to perform an adequate inspection.

Aside from the specific problems observed (reference Exhibit 20) and a number of concerns identified (to follow), the acceptability of HVAC hanger/support installations was generally determined to be adequate. Welding was good, although it was noted that most were at or over the maximum allowable size. All bolting reviewed was in accordance with applicable requirements. Although installations were rarely observed to be located at the nominal location prescribed, they were nevertheless located within the allowable six inch tolerance.

A number of installations were observed as having weld areas in an uncoated state (lacking touchup), with the welds being rusted due to exposure. Lack of touchup and apparent lack of controls to ensure that touchup gets accomplished is a generic concern, and is discussed further in the Coatings summary.

A concern was identified with regard to fireproofing material on four (4) installations, and is as follows. All supports are located in EAB-1 at elevation 35'. Hanger #S103 has its south attachment to a structural beam covered with fireproofing. Its north attachment has the fireproofing chipped away. Support #S105 has its north angle attachment to the structural beam covered with fireproofing. Support #S115 has both its attachments covered. Support #S116 has its south attachment to the structural beam above covered, and the north attachment uncovered.

Review of the verification documentation related to these installations did not result in a determination as to whether the fireproofing had been installed prior to the inspections, after, why it was removed in some areas, or whether controls were in place to ensure that those removed areas get re-fireproofed. This is considered to be an open item.

A total of twenty-five (25) records packages for EAB-1 installations which had been reviewed in the field were reviewed in STP-RMS, with problems or concerns being identified with thirteen (13), or approximately fifty percent (50%), of the sample selected. Specific observations, which are considered to be deficiencies, affected nine (9) of the 25, or thirty-six percent (36%) of the sample, and are discussed in detail on Exhibit 21.

The concerns identified dealt with the timeliness of QC supervision review of completed documentation packages. It was observed that this review has taken as long as a full year to be accomplished after the QC inspector had signed the report. The hardware-related concern regarding this observation is that, in the event a problem were to be identified so long after the inspection had been done, there would be an excellent chance that an adequate investigation could be hampered due to inaccessibility to a weld caused by other work or the welds being covered (e.g. - fireproofing), which could create the need for removal and replacement of the covering. The other concern regards overall timeliness, and is discussed in the Records summary.

Review of the applicable inspection procedure (QCP-10.21, revision 4) resulted in the generation of five (5) comments. These are discussed in Exhibit 22. It should be noted that one (1) comment addresses a condition which the PCVT considers to be a potentially causative factor to numerous welding-related problems observed during physical review of QC-accepted installations. It was observed that the QCP does not include weld size acceptance criteria, and numerous actual observations were made where QC had accepted welds of sizes which were either less than, or in excess of, applicable requirements. The other four comments deal with "workability" of the procedure.

In conclusion, one other concern was identified with regard to document control/ordering of drawings from FDCC. On June 13, the PCVT provided retrieval requests to FDCC to obtain HVAC-related drawings. These documents were provided without delay. On June 17, a similar request for other drawings was provided, but problems were encountered. It should be noted that this second request contained the same degree of information as the first (e.g. - vendor drawing number, BEC drawing log number, support number, etc.). The FDCC individual on June 17 could not, however, produce the requested documents. As the PCVT was advised, support drawings are filed with a unique sequencing number which must be cross-referenced with the area or building number (which is on the drawing). The cross-reference is made possible by an index which provides the needed information to retrieve the documents.

While the cross-referencing system was proven to be workable on June 13, it was not on the 17th. The stated reason for this was that the clerk who provided the documents on the 13th was not working on the 17th, and that clerk on the 17th was not familiar with the cross-referencing process.

Although the needed documents were eventually produced, the PCVT recommends that at least one clerk on each shift be trained to this retrieval process so that delays are not encountered during the actual CAT inspection. (In normal day-to-day activities, there do not appear to be problems, as field engineers have the cross-referencing index and provide all needed information when ordering documents.)

2. Ducting

A review was performed of hardware and software related to the installation and inspection of HVAC ductwork. Documents utilized during this review included, but were not limited to, the following:

Specifications (including all applicable changes)
5V279VS1003, revision 3 (now superseded)
3V279VS1000, revision 7

Procedure (including all applicable changes)
QCP-10.21, revision 4

The HVAC ductwork review was performed in unison with that part of the HVAC hanger review in the Unit 1 EAB. While the hangers selected were QC accepted, the corresponding ductwork was not. It was, however, reviewed by the PCVT, and time constraints prevented a further sampling of other HVAC ductwork which may have been QC accepted. Clearly then, there were no inspection-related issues identified during the review. There were, however, a number of observations and concerns identified which indicated a lack of construction adequacy, and one with regard to QC cognizance of applicable criteria (through interview). The following is an overview of PCVT observations for this commodity.

HVAC ducting was reviewed in its installed condition. Attributes verified included bolted connections, bolting material, dimensions, access plates, welding, huck bolts, and sealant. A total of twenty (20) duct pieces were reviewed, and a summary of observations is as found on Exhibit 23.

There were two (2) areas of concern identified with regard to environmental qualification of duct sealant and BISCO flexible connections, and details regarding each are as found on Exhibit 24.

During the review, the PCVT became aware of an issue regarding Ruskin Fire Dampers. The issue involves either potential or realized problems surrounding the acceptability of these items, installation, testing, use of procedures, and nonconformance control. Details regarding this issue are as found on Exhibit 25.

PCVT interviews with FSI QC personnel (Lead and Supervisor) resulted in a determination that QC may not be aware of, or have adequate access to, certain criteria which is needed in order to perform an adequate verification.

Specification 5V279VS1003, revision 4, prohibits the use of huck bolts in ductwork for the Control Room Envelope (EAB), Exhaust System (FHB) and the Technical Support Center areas (EAB). When the cognizant QC Lead and QC Supervisor were questioned regarding

(the use of huck bolts in prohibited areas, they stated that QC has no means to determine where the boundaries are located for the prohibited use of huck bolts.

If this is actually the case, it would seem to follow that QC also has no way of verifying that the specification restrictions are not violated; also, that apparently no one is making this verification. This is considered to be an open item/potential deficiency.

(In light of the conditions observed, the PCVT recommends that this be investigated to substantiate the QC statements, and that, if no established boundaries exist for QC use, they be provided this necessary information (e.g. - drawings, procedures, etc.) which should clearly define the boundary limits of these areas where use of huck bolts is prohibited.

EXHIBIT 1PIPING/WELDING - ACCEPTABLE HARDWARE VERIFICATIONS

The following is a listing of hardware-related observations made by the PCVT with no problems or areas of concern having been identified.

1. Valve orientation - total of eight (8) valves
 - Drawing 2M369PCV217, sheet 31, revision 1
Valves CV-0422, XCV-223, XCV-0229A
 - Drawing 369PCV217, sheet 2, revision 3
Valves XCV-0102, PCV-0135, XCV-0103, CV-0104, XCV-0098
2. Surface preparation (ISI welds) - total of six (6) welds
 - Drawing 2M369PCV217, sheet 31, revision 1
Field welds 24, 25, 26, 28, 29 and 38
3. Socket weld couplings - total ten (10) fittings
Verified various socket weld fittings ranging in size from 1/2" to 2" in storage area at the top of Fuel Handling Building #1. Verification was that, as a minimum, couplings were at least 3000 lb. class as required by specification.
4. Flanges, for damage - total of four (4) flanges verified
 - Drawing 3M369PCC207, sheet 20, revision 3
Line 6" 1424-WA3 - two (2) flanges verified
 - Drawing 4M369PCV217, sheet 2, revision 3
Line 4" CV-1019-PB2 - two (2) flanges verified
5. Verified satisfactory issuance and control of purge dam material.
6. Verified that indentation markings did not exceed the maximum 1/32" depth (approximately 18 randomly selected depth measurements taken with a pit gauge).
 - Drawing 4M369PCV217, sheet 2, revision 3 - indentations verified between penetration #1795 and FW 0001 (on line 4" CV-1019-PB2)
 - Drawing 4M369PCV217, sheet 2, revision 3 - indentations verified between FW 3 and FW 9 (on line 4" CV-1018-KB2)

7. Verified that "V" markings were applied for locating ISI welds - six (6) welds verified.

- Drawing 2M367PCV217, sheet 31, revision 1

Field welds 2, 3, 25, 26, 28 and 29

8. Verified by visual examination the weld quality of forty-six (46) welds and the overall dimension of thirty-five (35) welds.

- Drawing 4M369PCV217, sheet 2, revision 3 - verified sixteen (16) various field welds with eighteen (18) dimensions being checked

- Drawing 4M369PCV217, sheet 4, revision 4 - verified eight (8) field welds (FW 1 - 4, 14, 15, 16 and 18)

- Drawing 2M369PCV217, sheet 31, revision 1 - verified six (6) field welds (FW 24, 25, 26, 28, 29 and 38) and verified seventeen (17) weld dimensions

- Drawing 3M369PCC207, sheet 20, revision 3 - verified seven (7) field welds (FW 1, 2, 48, 49, 50, 54 and 55)

- Drawing 2M369PCV217, sheet 20, revision 2 - verified nine (9) field welds (FW 4, 5, 7, 8, 9, 10, 12, 13 and 17)

9. Verified adequate maintenance program for the control of welding material by the contractor.

EXHIBIT 2

PIPING/WELDING - DEFICIENCIES IN PROCESS OF CORRECTION

The following observations were made where corrective actions were determined to have been already initiated by the constructor or engineer.

1. The PCVT identified an excess of eighteen (18) field welds and additionally, an undetermined number of vendor welds without the required "V" markings.

This condition was identified in CAR G-313 which is now closed. The response initiated a retrofit program for ISI grinding and marking of vendor and B&R field welds. In addition, procedure QCP-9.1 was revised by Attachment "S" and PCR #2 to address the retrofit requirements and inspection attributes.

2. The PCVT observed piping material and fittings (all safety related) which had impression markings on materials less than 1/4" thick. This condition had already been identified by the constructor, and NCR BP-00764 had been initiated. Approximately 4000 feet of carbon steel and stainless steel pipe and an undetermined amount of fittings were involved.

3. The PCVT observed ten (10) incidents of potential interference between systems and components during an evaluation of the CV and CC piping systems. Clearances ranging from 1/4" to 5" were observed between the piping and hangers, HVAC ducts, instrument racks, instrument supports and other piping.

This condition has been reported by INPO and is currently pending resolution via IRC #238 and DER #85-018 (Unanalyzed Seismic Interactions, reference ST-YB-HL-11842 dated May 22, 1985).

EXHIBIT 3LIMITED ACCESS WELDS, WELDER ASSIGNMENT AND IN-PROCESS INSPECTION

1. Deficiency (limited access welds/welder assignment)

Specification 5A010PS002 requires that only qualified and skilled welders with demonstrated proficiency be assigned for welding limited access joints. Also, that procedures " . . . shall indicate the methodology used to establish that a skilled welder is used."

A review of procedure QCP-9.1, revision 4 (Weld Inspection Piping ASME), indicates that the welding supervisor only evaluates for physical restrictions, and if less than 12" or an obstruction exists, the weld is considered limited access. The Process Data Checklist is then identified as "limited access" and initialed and dated by the welding supervisor. The procedure does not indicate the methodology that is used to establish that a skilled welder is used. Statements by the constructor's QC inspectors and the QC supervisor indicate that the foreman assigns a welder to limited access welds using his best judgement, and that a procedure does not exist for qualification of limited access welders other than the hire-in qualification test.

A subsequent interview with welding engineering indicates that the assignment of welders to limited access joints is by utilization of the ESI "Monthly X-Ray Report for Final Welds". It should be noted that this list does not include a rejection rate for discrepancies detected by Informational RT examinations. The selection of a welder utilizing this list may not be appropriate when these rejection rates are considered.

Based on the foregoing, it is the PCVT opinion that an adequate procedure does not exist which indicates the methodology for selecting a welder for limited access welds. Also, the use of information which may not represent the welder's actual proficiency is questionable. In this light, the PCVT offers the following recommendations:

- A. Revise existing procedures to clearly define the methodology which is used to assign qualified and skilled welders with demonstrated proficiency for welding limited access welds. The procedure should define how the welder is to demonstrate proficiency and how the results are to be documented.
- B. Rejection rates of Information RT examinations should be included as supplemental information or included in an existing listing for the selection of limited access welders. The procedure should be revised to include this requirement.

A response has been received from the PCRT which partially addresses the deficiency identified, although the PCVT feels that actions to be taken may not be sufficient. In that response (ECI Interoffice Correspondence (IOC) from F. G. Miller to R. Rebel dated June 21, 1985, file #FM-85-0261), ECI stated that, although they feel that information radiographs " . . . often are not acceptable to satisfactorily interpret" (due to non-use of penetrameters - discussed further in RT summary), the results of information shots would be included in the next issue of the individual

"Welder Reject Rate" report, and that CSP-88, paragraph 8.01.02, would be clarified " . . . to further describe the appropriate methodology for welder selection."

Due to the unacceptability of informational radiography practices and the fact that the PCVT observed no welder selection methods in the procedure which could be " . . . further described . . .", it is recommended that this issue be closely followed to an adequate resolution by the project.

2. Concern (in-process inspection)

Specification 5A010PS002 requires in part that, "Quality Control monitoring of the welding . . . shall be conducted without exception (for limited access welds)". Also, both in-process and final acceptance hold points shall be required for all safety class 1, 2 and 3 piping systems.

A review of procedure QCP-9.1, revision 4, indicates that the QC inspector will monitor the weld in process and report any nonconforming conditions per the requirements of QCP-15.1.

Statements by the constructor's QC inspectors and the QC supervisor indicate that QC does not monitor in-process welding of limited access welds because there are no requirements. When welders in QC were asked how the welding amperage was monitored, they indicated that craft supervision accomplishes this check every two (2) weeks or every month. Documentation for the following was reviewed to determine the validity of these statements:

- Line CV1006, field welds 1 - 7 and 11 - 16
- Line CV1116, field welds 5, 7 and 8
- Line CV1097, field welds 28 and 29
- Line CV1213, field welds 2 and 3

Five (5) of the welds were identified as limited access, and the only in-process inspections conducted, other than fit-up and final weld attributes, were interpass temperature verifications for two (2) welds. The remaining fifteen (15) welds were verified for interpass temperature (10 welds) and amperage (5 welds).

It is the PCVT's opinion that the procedure does not clearly define the QC inspector's responsibilities with regard to verification of attributes or the frequency of in-process inspections. If in-process inspections are being conducted on an ongoing basis in excess of that which had been observed, objective evidence was not presented to the PCVT for assessment.

In light of the observations made, the PCVT offers the following recommendations:

- A. Revise the procedure to clearly define the attributes which are to be verified and the frequency and methods for documenting the results.
- B. Conduct formal training classes for QC personnel for in-process inspection requirements.

EXHIBIT 4RADIAL SHRINKAGE IN CIRCUMFERENTIAL BUTT WELDS

The PCVT observed an incidence of radial shrinkage to a depth of .065 inch in a 6 inch diameter circumferential butt weld. This type of anomaly was addressed as being acceptable by Request for Engineering #P-4-85-0070 dated January 25, 1985, provided that the parameters of the WPS are followed.

On May 30, 1985, a request was made by the PCVT that HL&P Engineering provide information with regard to the permissible depth and length of radial shrinkage, and if the designer had evaluated the stress intensification effects of circumferential welds when this anomaly is present. HL&P response dated June 6, 1985, recommended in part that the condition be "accepted as is" subject to the following checks:

1. The weld has not been distorted by excessive weld repairs. This could result in excessive sensitization and is not desirable.
2. There is no evidence of block welding (e.g. - welding in heavy blocks instead of the usual narrowed bead techniques specified to minimize sensitization).

After review of the HL&P Engineering response and the condition observed, the PCVT has arrived at the following conclusion. Items 1. and 2. cannot be verified as the weld was completed and QC final accepted on July 25, 1984. The only inspections conducted (visual) were the fit-up and welding attributes (e.g. - cleanliness, fit-up, purge, pre-heat and final inspection). Also, block welding restrictions in specification 5A010PS002 have not existed until the issuance of SCN #22 dated June 7, 1985, which was issued as a result of a PCVT observation.

The lack of documented evidence of in-process inspections, QC's lack of knowledge of in-process inspection requirements, the use of the Monthly Welding Report (which does not include information X-ray rejection rates) and the constructor's practice of not documenting information NDE repairs precludes an assessment by the PCVT of the "OK as is" recommendation. The attributes to check can only be verified by in-process inspections. A documented program is not in place which sufficiently prescribes or implements in-process inspections.

In consideration of the previously mentioned observations and information provided, the PCVT offers the following recommendations:

1. Develop criteria for radial shrinkage for light wall stainless steel welds based on the applicable WPS. If the WPS does not sufficiently describe the technique for shrinkage reduction, requalify the procedure and clearly define the parameters.
2. Revise procedure QCP-9.1, revision 4, to include those attributes to verify during in-process inspections which will reduce excessive radial shrinkage. Address maximum allowable shrinkage.
3. Determine if the designer has evaluated the stress intensification effects at circumferential welds when this anomaly is present.

EXHIBIT 5BLOCK WELDING

The PCVT observed an incidence of suspected block welding which was satisfactorily resolved between the PCVT and the BEC/ECI Welding Engineering. The suspected weld was stated to have been actually welded using a bead sequencing technique which does not constitute block welding. This occurrence was further substantiated by written statements by the welder and the QC inspector that block welding was not utilized. This specific issue has been determined to be satisfactorily resolved. A concern still exists, however, because the cause that initiated the observation was statements from the QC inspector and QC supervision that block welding was not an essential attribute to verify since acceptance criteria did not exist in the applicable specifications and procedures. Subsequent to the PCVT investigation, specification 5A010PS002 was revised by SCN #22 dated June 7, 1985, to include block welding restrictions.

As part of the PCRT response to this item, a commitment was made to revise procedure CSP-84 to address block welding restrictions. The PCVT feels that the QCP should also be revised so that QC personnel have specific direction regarding this perceived essential verification attribute, and recommends that this issue be continued as an open item until appropriate procedural revisions are completed and verified.

EXHIBIT 6ARC GOUGE DAMAGE TO INSTALLED ITEMS BY WELDING LEADS

The PCVT observed three (3) incidents wherein damage to installed items was caused by either damaged or exposed welding leads. Details regarding specific items observed are as follow:

- Line CC-1485 near hanger HL5011 - Observed condition was a 3/16" diameter by 1/16" deep arc gouge in the base material. Response to this observation involved ESI-initiated Base Material Surface Condition Report #1-001M on June 21, 1985.
- Structural steel hanger EWR6795 - Condition observed was a 1/2" diameter by 1/32" deep arc gouge in the material. Preliminary investigations by the Response Team indicate that this is a non-safety related installation.
- Line CV-1006-KB2, 4" stainless steel pipe - Condition observed was a 1/2" wide by 11" long and approximately 1/32" deep arc gouge in the material. In response to this issue, ESI generated DN #1-443M on June 14, 1985.

A PCVT review of Deficiency Notices (DN) and Nonconformance Reports (NCR) documents issued since May 31, 1984, indicated that six (6) out of sixty-two (62) reported arc strike damage incidents were a condition caused by bare or damaged electrical cables. It appears that a trend could be developing concurrent with another trend of arc strike incidents. It also appears that corrective actions to date have not been taken to preclude repetition of a condition adverse to quality.

Regarding arc strike damage, the PCVT recommends that a historical review be made for damage incidents caused by exposed welding or electrical cables concurrently with that for arc strike incidents, and that a determination be made with regard to the existence or development of a trend, including appropriate actions being taken based upon the results (e.g. - TIR, SDR). It is also recommended that an investigation be made into the construction practice of suspending electrical cables by wrapping them around piping. Two (2) instances were observed where electrical cables were suspended in this manner (on line 4" CV-1019-F between FW 007 and hanger HL5004 on drawing 4M369PCV217, sheet 2, revision 3).

EXHIBIT 7

PIPING/WELDING - RECORDS REVIEW

The PCVT reviewed documentation (records) packages for eight (8) field welds (FW) as listed below.

- Drawing 2M369PSI272, sheet 2, revision 4; line SI-1118-UB2; FWs 1, 4, 13, 13A and 14
- Drawing 2M369PCV217, sheet 31, revision 1; line CV-1097-UB2; FWs 30, 31 and 32

Specification 5A010PS002 requires that permanent plant documentation be readily available and, as a minimum, contain eleven (11) categories of attributes which are listed in paragraph 3.2.5.a. Review of the 8 documentation packages indicated that one (1) or more of the three (3) listed attributes in the specification (as described below) have not been satisfied. These 3 attributes are:

- Signatures/initials of the Inspector who accepted the hold point are not recorded; acceptance stamps are utilized.
- Identification of the fabrication code has not been recorded.
- Verification reports of NDE, performed for acceptance of the weld, are not always included.

An additional observation by the PCVT with regard to FW 4 on line SI-118-UB2 is as follows. The material thickness recorded on the PDC for this weld is .280 inches. The material thickness for this same weld on the reader sheet for radiographic testing is .241 inches. Also, the reader sheets for this weld (two included in package) contain evaluations for areas 0-5 and 15-0. One (1) reader sheet indicates lack of fusion as being rejectable, and the other, by the Level III examiner, indicates acceptance of the same areas. A clarification with regard to the revision of the disposition is not recorded on the reader sheets, and is considered to be an open item.

With regard to the results of the records review, the PCVT offers the following recommendations. A review should be conducted of the subject record packages to assess the technical adequacy and completeness. Any missing documents should be obtained and included into the record packages. Based on the results of this review, a determination should also be made with regard to the potential generic implications of the deficiencies observed.

EXHIBIT 8

PIPING/WELDING - INSTALLED EQUIPMENT PROTECTION

The PCVT observed two (2) instances of inadequate protection to items in the plant. It should be noted that the generic issue of protection has already been identified on SDR H-097; therefore, no generic actions in this regard are required. However, the specific observations made are presented as follow for evaluation and action, as appropriate.

The constructor's procedure CSP-16 requires that open pipe, fittings, valves and equipment be capped or covered when no work or inspection activity is in process. Contrary to this requirement, the PCVT observed the following:

- A 90 degree elbow had not been installed per drawing 4M369PCV217, sheet 2, revision 3. Consequently, piping was exposed at welds #FS1691 and FS1692, and protective covers were not installed to preclude contamination.
- Approximately one (1) teaspoon of sand was found in the interior of valve #CV-0422 (drawing 2M369PCV217, sheet 31, revision 1).

The PCVT recommends that actions specific to the above items be taken to remove visible contamination and install adequate protective closures.

EXHIBIT 9

PT - PROCEDURAL, PROCUREMENT ISSUES

I. Review of Procedure NDE-006-1, revision 1, with addendum #5 resulted in the following observations:

- a. Paragraph 6.1 - Although intermingling of family groups is prohibited, the procedure does not indicate which penetrant cleaner and developer comprise a family group.
- b. The procedure qualification reports do not indicate the manufacturer's identity for the family related group qualified. It is not apparent that a family group was qualified.
- c. Paragraph 6.1 - Some of the penetrant materials listed for Magnaflux Corporation do not correlate with other materials listed to make a family group, i.e. - SKL-NF penetrant does not exist; SKL-HS penetrant does not have the required cleaner and developer listed which makes the family group (SKL-HS is also obsolete); SKD-HT added by Addition #3 does not have the required penetrant and cleaner listed to make a family group; ZP-4 (a dry developer) is obsolete due to difficulties with maintenance of low chloride and sulphur content; ZP II is obsolete.
- d. Specification 4L360JS1000, revision 3, paragraph 7.2.4.2 restricts penetrant types to solvent removable or water washable. Some of the materials listed are not solvent removable or water washable.

Note: Only Magnaflux materials were investigated.

II. After review of the procedure and the identification of the concerns regarding PT materials, a review of actual records related to received items was made, and the following observations were noted:

- a. MRR #Z13014, revision 1, dated January 7, 1984, does not describe the Magnaflux material being ordered; the description is only "Magnaflux Dry Penetrant".
- b. The test report for the material received (SKC-5 cleaner/remover #84H057) contains an attachment "Product Data Sheet SK-C-1". This attachment, however, describes cleaner/remover SKC-NF/7C-7B, not the material as identified on the test report. The SKC-NF/7C-7B is a chlorinated solvent which has not been qualified with the present special family group being utilized by ESI.

Based on the observations as described in I. and II., the PCVT recommends that appropriate reviews/investigations be made, and that procedure revisions be implemented to describe actual practice with regard to materials' family group usage. Also, it is recommended that special training/instruction be provided to applicable personnel to ensure that materials are clearly specified in procurement documents, and that materials (and documentation) are adequately verified upon receipt. For one more recommendation regarding the procedure reviewed, refer to Item #1 of Exhibit 10 (next page).

EXHIBIT 10
WITNESSING OF PT ACTIVITIES

The PCVT witnessed the performance of nine (9) examinations on socket welds. The welds examined were as follows:

- line #CV1114UB2, field weld (FW) #23, 2" SS socket
- line #CV1106BB2, FW #37, 2" SS socket
- Drawing 5M369PEW229-A04, revision 5, FW #50 and 51, 2" aluminum bronze sockets
- Drawing 5M369PEW229-A05, revision 4, FW #31 through 35, 2" aluminum bronze sockets

Results of the PT examinations ultimately indicated that the welds were acceptable. However, the following observations were made during the performance of these examinations. It should be noted that the following is a composite of all observations made. Each specific examination may not have been affected by each specific observation.

1. Pre-test visual examination of the test area was apparently inadequate in that repetition of examinations was needed due to excessive nonrelevant indications and broad areas of pigmentation which could have masked indications of surface discontinuities (defects).

Note: Procedure (NDE-006-1) does not address broad areas of pigmentation which could mask indications of defects. (Reference ASME Section V, T-670(c)).

Recommendation: Add requirements in the procedure to address broad areas of pigmentation. Reinstruct examiners regarding pre-inspection of surfaces to be examined to ensure a suitable condition for PT.

2. Lighting in the area was inadequate for the performance of PT examination. The examiner did not utilize a flashlight until observing the PCVT reviewer doing so.

Recommendation: Reinstruct examiners regarding lighting requirements of the PT procedure, and utilize supplementary lighting (e.g. - flashlights, droplights) for pre-examination and examination.

3. A pyrometer, although on hand, was not used to verify the acceptability of the tests areas' surface temperatures.

Recommendation: Reinstruct examiners with regard to their responsibility to ensure temperature requirements as per PT procedure.

4. An apparently unidentified file was used to prepare a weld surface for PT examination. Specification 5A010PS002, revision 6 requires that files be identified with regard to their intended usage.

Recommendation: Assess controls in place regarding the identification of hand tools; make any necessary changes/additions; reinstruct craft's personnel regarding established requirements.

EXHIBIT 11
WELDER QUALIFICATION RT

I. Problem

ASME Section V, T-221.2, requires in part that, "weld surface irregularities be removed . . . by any suitable process to such a degree that the resulting radiographic image due to any irregularities cannot mask or be confused with the image of any discontinuity."

Review of RT film for welder qualification tests #PQT 2671 (views 0 - 4 and 4 - 8), and PQT 4256 (views 0 - 4 and 16 - 0) exhibited surface irregularities, radiographic images of which either mask or could be confused with the image of discontinuities.

Although these images were readily apparent to both of the PCVT reviewers (both either present or previous Level III RT examiners) who evaluated the film, the ESI examiner interpreted these indications as being suckback and undercut (at the root), and accepted them. These films were interpreted by a Level II examiner and signed off by a Level III examiner. Based upon the ESI interpretation of these images as being suckback and undercut at the root (note that a backing ring was used in the test coupon), the PCVT questions as to whether a visual correlation between the radiograph and the surface of the weld was performed (similar to that required for welds by ASME section III, NX-4424(a)) prior to acceptance of the film.

It should be noted that a condition similar to this was previously identified on HL&P CAR #G-528.

The PCVT recommends two specific actions with regard to this issue:

1. Reinspect RT examiners regarding surface preparation requirements to preclude interference by undesired images in the area of interest. This reinspection should stress correlation of actual weld surfaces to the radiograph itself, and documentation of the visual examinations should be made to substantiate RT evaluation conclusions.
2. Reevaluate the validity of welder qualifications for PQT #2671 and PQT #4256. Perform a sampling re-review of other welder qualification film to determine if similar conditions exist on a generic basis, and take appropriate actions.

II. Concern

The PCVT observed that radiographs of welder qualification tests are not being maintained with the qualification documentation packages in STP-RMS. These radiographs are being maintained by ESI at their welding lab in an environment which is apparently inappropriate for the storage of RT film. (Several radiographs reviewed were actually adhered to each other due to excessive moisture.)

This observed practice is not consistent with that of the previous constructor, which transmitted radiographs of welder qualification tests to the site records vault on an ongoing basis.

Especially based on the observations made as described in I. to this Exhibit, the PCVT recommends that ESI be directed to forward all existing and future welder qualification RT film to the STP-RMS site records vault where they can be maintained in an appropriate environment until such time as their purpose has been fulfilled.

In response to this item, the PCRT stated that no Code requirements exist for maintaining Qualification tests; that only Code required data is maintained in SIRG, that data being the test form and signed-off NDE reports.

The PCVT concurs that no Code requirements exist, but Code requirements are not at issue. The reasons why the PCVT recommends forwarding of this film to STP-RMS (not SIRG) are reiterated as follow:

- Questionable qualifications as discussed in I. of this Exhibit
- Retention methods and environment as discussed above
- Transfer custody to the owner

Based on these reasons, the PCVT concerns and recommendations stand.

EXHIBIT 12NDE PERSONNEL QUALIFICATIONS/CERTIFICATIONS

I. Documentation checked during PT related reviews

The qualification/certification records for two (2) examiners were reviewed. The procedure utilized during this review was NDE-001, revision 11. Results of these reviews indicated that a number of anomalies existed which required resolution. The anomalies were considered to be unresolved, and a response was requested by June 28, 1985. None was received, so these items are considered remaining unresolved.

Packages reviewed apply to a Mr. R. Ramey and a Ms. M. Brown/Matteson. Observations are as follow:

R. Ramey

- Eye examination form as specified by NDE-001 was not utilized.
- Radiographic (RT) tests were not in package; Magnetic Particle (MT) and PT tests were.
- MT Practical examination stated on the checklist that "Inclusion in area 19 3/4 not properly identified, and failure to pick up indication located at 1", 1 1/8" from toe of weld."

It appeared as if there were eight (8) indications in test specimen #NDE-001 (8" dia. sch. 80 pipe), according to those found and those stated not to be found. If, according to the practical checklist, one indication was improperly identified and two others were missed, it seems as if a failure would be required as per paragraph 8.4.B.3 of NDE-001. No other documentation existed in the package which would indicate that additional training and retesting had occurred. If this is, in fact, the case, and documentation cannot be provided, it would appear as if certification was not appropriate.

- PT Practical examination checklist indicated that two (2) test specimens were used; 1) 8" dia. sch. 80 pipe (NDE-001), and 2) 1/2" plate (NDE-002). A notation is entered on the checklist that "... retest due to incorrect application of developer on 8" dia. pipe." There is no evidence in the package that the retest was taken and passed. If this is, in fact, the case, and documentation cannot be provided, it would appear as if certification was not appropriate.

M. Brown/Matteson

- Eye examination form as specified by NDE-001 was not utilized. Additionally, previous eye exams indicated the use of contact lenses. The current exam did not reflect this.

- Documentation existed in this package which substantiated radiation safety training and examination; also, a completed form which had been sent to the state of Texas to indicate the training. It is not clear as to whether similar documentation should exist for Mr. Ramey.
- The certification package and all documentation therein identified the examiner as M. Brown. However, this examiner's current and correct name is Matteson, not Brown.

It is recommended that this individual's file be updated and that controls be established to ensure that personnel certification files get updated when situations such as name changes occur.

II. Documentation checked during RT related reviews

Ebasco procedure #NDE-1 requires yearly verification of NDE personnel's visual activity. The qualification records provided by STP-RMS for the following individuals did not contain current eye examination records:

| <u>Examiner</u> | <u>Level</u> | <u>Eye Exam in File</u> |
|-----------------|--------------|-------------------------|
| D. McCausland | RT II | 9-2-83 |
| W. Lear | RT III | 1-25-83 |
| T. Henly | RT II | 11-28-83 |
| G. Marshall | RT I | 11-2-83 |
| R. Lewis | RT III | 6-12-84 |
| W. Pugh | RT III | 1-3-84 |
| R. Hall | RT II | 9-14-82 |

The PCVT reported this as an open item, requesting response by June 28. None was received, so this is considered to be a continuing open item. Although not verified by the PCVT, it was further confirmed that the required records to substantiate these individuals' current eye examinations exist and are in ECI custody, but have not been forwarded to STP-RMS. The PCVT considers this to be a failure to forward required records (note - one examiner's exam is nearly three (3) years old).

EXHIBIT 13
MT RECORDS REVIEW

| <u>Line #</u> | <u>FW #</u> | <u>Date/RPT #</u> | <u>Proc. Rev. #</u> | <u>Prod. Spcg.</u> |
|---------------|-------------|-------------------|---------------------|--------------------|
| CH-2131 | FW-0039 | 12-15-84/MT-1095 | 1 | 3" - 6" |
| CH-1131 | FW-0023 | 3-9-84/MT-680 | 1 | 3" - 5" |
| DO-1005 | FW-0004 | 12-26-84/MT-1108 | 1 | 3" - 6" |
| CH-1230 | FW-0027 | 5-2-84/MT-802 | 1 | 3" - 6" |
| CH-1204 | FW-0002 | 11-2-84/MT-1034 | 1 | 3" - 5" |
| CH-1131 | FW-0028 | 10-17-84/MT-1010 | 1 | 3" - 6" |
| CC-1129 | FW-0073 | 5-10-84/MT-818 | 1 | 3" - 6" |
| CC-1217 | FW-1061 | 4-2-84/MT-747 | 1 | 3" - 5" |
| CC-1425 | FW-0001A | 7-17-84/MT-916 | 1 | 3" - 6" |
| CC-1425 | FW-0002 | 8-4-84/MT-955 | 1 | 3" - 5" |
| CC-1471 | FW-1005 | 6-25-84/MT-880 | 1 | 3" - 6" |
| CC-2101 | FW-0003 | 10-24-84/MT-1024 | 1 | 3" - 5" |
| CC-2102 | FW-0001 | 9-19-84/MT-990 | 1 | 3" - 6" |
| CC-2302 | FW-0002 | 4-9-84/MT-767 | 1 | 3" - 5" |
| CC-2302 | FW-0013 | 7-27-84/MT-942 | 1 | 3" - 5" |
| CC-2425 | FW-0017 | 9-11-84/MT-980 | 1 | 3" - 5" |
| CC-2428 | FW-0003 | 7-20-84/MT-926 | 1 | 3" - 6" |
| CC-2442 | FW-0001 | 12-11-84/MT-1084 | 1 | 3" - 6" |
| CC-2617 | FW-0003 | 12-27-84/MT-1110 | 1 | 3" - 6" |

EXHIBIT 14

PIPE SUPPORTS/HANGERS SUMMARY

Deficiency/Quantity

Fasteners, Locking Devices/(24) total deficiencies

- * Missing nuts - (5)
- * Loose nuts/bolts - (6)
- * Incorrect nuts - (1)
- * Thd. engagement - (1)
- * Missing cotter pins - (2)
- * Broken cotter pins - (3)
- Undersized cotter pins - (2)
- * Unspread cotter pins - (2)
- Wire used in place of cotter pins - (2)

Installation Errors (mislocated/misoriented)/(9) total deficiencies

- * Hangers mislocated - (5)
- * Rear brackets misoriented - (2)
- * Paddle cocked - (1)
- * Strut askew - (1)

* Interference/(7) total deficiencies

- * Paddle/rear bracket - (1)
- * Paddle/spacer - (3)
- * Hanger rod/clamp - (1)
- * Other systems - (2)
 - Another line's hanger (approx. 1")
 - Conduit (contact)

Pipe Support to Clearance/(6) total deficiencies

- * Not enough - (4)
- * Too much - (2)

Welding/(6) total deficiencies

- * Undersize - (3)
- Incorrect (fillet vs. butt) - (2)
- * Incomplete - (1)

Inconsistent Clamp Spacing & Clamps Cocked/(8) total deficiencies

- * Inconsistent - (6)
- * Cocked - (2)

- * Identical or similar to deficiencies identified during NRC CATs at other projects.

(Deficiency/Quantity

Rusted and/or Painted Load Pins/(6) total deficiencies

Missing Spacers/(5) total deficiencies

Clamp spacers - (2)

Bearing spacers - (3)

Dimensional Errors/(2) total deficiencies

Strut length - (1)

* Edge to U-strap - (1)

* Abuse/(2) total deficiencies

(use of struts to tie off air hoses, welding leads, etc.)

Support Beam Unstable/(1) total deficiency

(* Identical or similar to deficiencies identified during NRC CATs at other projects.

EXHIBIT 15PIPE HANGERS AND SUPPORTS - DETAILED VERIFICATIONS

| <u>Hanger #</u> | <u>Pipe Line #</u> | <u>QC Acc.</u> | <u>Observations</u> |
|-----------------|--------------------|----------------|--|
| HL5004 | CC-9485 | X | 1. Rear bracket weld should be 5/16"; is 1/4" 2. Inadequate clearance between pipe & U-bolt 3. Strut length should be 4' 11 1/2" (ref.); is 4' 4" 4. Strut lock nut loose 5. Bearing space omitted at clamp 6. Clamp cocked at approx. 7 degrees |
| HL5010 | CC-9485 | X | Actually not installed |
| HL5011 | CC-9485 | X | No problems observed |
| HL5016 | CC-9485 | X | 1. Rear bracket not oriented as per support detail drawing |
| HL5017 | CC-9485 | X | 1. Supports 5017 & 5018 installed reverse of configuration shown on drawing 2. Inconsistent clamp spacing; 5/16" tension, 1/2" spacer |
| HL5018 | CC-9485 | X | 1. Not properly located in relation to 5017 2. Cotter pin broken - clamp side of load pin * 3. Support beams unstable |
| HL5010 | CC-9206 | X | 1. Clamp spacer/strut paddle interference |
| HL5009 | CC-9206 | X | No problems observed |
| SS0001 | CC-9206 | X | 1. Welds not completed as specified on detail drawing |
| HL5002 | CC-9206 | X | 1. Rear bracket weld should be 3/8"; is 5/16" |
| HL5003 | CC-9206 | X | 1. Strut lock nut loose 2. Load pins rusty |
| HL5001 | CC-9206 | X | 1. Rear bracket weld should be 3/8"; is 5/16" |
| HL5007 | CC09206 | | 1. Bolt loose on pipe clamp 2. Missing clamp spacer 3. Hanger rod/clamp interference |

* Currently under evaluation by HL&P Engineering for design adequacy.

| <u>Hanger #</u> | <u>Pipe Line #</u> | <u>QC Acc.</u> | <u>Observations</u> |
|-------------------|--------------------|----------------|--|
| GU0006 | CC-9485 | X | <ol style="list-style-type: none"> 1. Inconsistent clamp spacing; 1/4" tension, 5/8" spacer 2. Rusty load pins 3. Potential interference problem with pipe line #CC-1314, hanger #RR0011 (approx. 1") |
| GU0001 (a & b) | CC-9485 | X | <ol style="list-style-type: none"> 1. (2) jam nuts used at tension bolt (a) 2. Missing bearing spacers (a) 3. Pipe clamp and load pin cocked at approx. 5 degrees (a) 4. Missing, loose strut lock nuts (a & b) 5. Broken, missing and undersized cotter pins (a & b) 6. Wires used in lieu of cotter pins (a & b) 7. Load pins painted and rusty 8. Struts being utilized to support air hoses, welding leads, temporary lighting |
| HL5006 | CC-9485 | X | <ol style="list-style-type: none"> 1. Dimension from edge of W4X13X12 beam to U-strap "UH-8" should be 1"; is 3 3/4" 2. Lower Hilti-bolts do not have full thread engagement 3. Pipe and U-strap side clearance not maintained |
| RR0026 | SI-9105 | X | <ol style="list-style-type: none"> 1. Clamp spacer/paddle interference 2. No jam nuts on clamp 3. Paddle/rear bracket interference 4. Cotter pins are unspread |
| RR0007 | SI-9202 | X | <ol style="list-style-type: none"> 1. Side clearances between piping & support not maintained (1/16", 0) 2. Excessive clearance (1 3/16") between piping & support at the bottom |
| RR0007 | SI-9302 | X | <ol style="list-style-type: none"> 1. Side clearances between piping & support not maintained (1/16", 0) |
| RH0007 | SI-9102 | X | <ol style="list-style-type: none"> 1. Strut jam nut loose 2. Inconsistent clamp spacing; 3/8" tension, 1/4" spacer |
| HL5011 | SI-9206 | X | <ol style="list-style-type: none"> 1. 1/8" gap exists between pipe & clamp 2. Clamp ears bent - gap at load pin is 3/4"; at clamp spacer is 5/8" |
| RH0012 | SI-9118 | X | No problems observed |
| HL5018 | SI-9101 | X | No problems observed |

| <u>Hanger #</u> | <u>Pipe Line #</u> | <u>QA Acc.</u> | <u>Observations</u> |
|-----------------|--------------------|----------------|---|
| HL5010 | SI-9301 | X | 1. Weld symbol calls out a single bevel butt weld; actual weld is a fillet 2. Load pins rusty 3. Inconsistent clamp spacing, 11/16" tension, 1/2" spacer |
| RR0054 | SI-9106 | X | 1. Clamp ears bent - gap at spacer is 1"; at load pin is 1 3/16" 2. Strut jam nut missing 3. Cotter pins at rear bracket unspread 4. Strut assembly askew approx. 10 degrees |
| HL5009 | SI-9201 | X | 1. Load pin rusty 2. Clamp end paddle cocked 3. Weld symbol calls out a single bevel butt weld; actual weld is fillet |
| GU0070 | SI-9106 | X | No problems observed |

WALKDOWN VERIFICATIONS

| | | | |
|-----------------|---------|---|--|
| HL5006 | CC-9206 | X | 1. Clamp spacer/paddle interference |
| RR0015 | CC-9206 | X | 1. Rusty load pins 2. Missing bearing spacers 3. Missing jam nuts 4. Missing clamp spacer |
| RH0012 | CC-9206 | X | 1. Rear bracket misoriented approx. 30 degrees 2. Interference - conduit in contact with strut |
| HL5011 | CC-1206 | | 1. Installed in location other than that shown on applicable ISO |
| HL5009 & SS0001 | CC-9206 | X | 1. Hangers are installed in a reverse orientation than that on ISO |

EXHIBIT 16

OBSERVATIONS MADE DURING PRE-CAT PIPE SUPPORT VERIFICATION

1. Deep arc strike observed on pipe (line #CC-9485) near hanger #HL5011.
2. Questionable use of weld symbols was observed on detail drawings for hangers #HL5007 (line #CC-9206), #RR0007 (line #SI-9202), #RR0007 (line #SI-9302) and #RH0007 (line #SI-9202).
3. Isometric drawing for line #SI-9202 does not indicate the required location of support #RR0007.
4. While obtaining documents, it was observed that the cross-reference index between CADD and line isos did not reference the correct drawing. Further, the correct drawing did not show the support's location. This was observed with regard to support #HL5011 on line #SI-9206.
5. While verifying support #RR0054 on line #SI-9106, it was observed that the iso did not indicate support numbers.
- *6. On 16" CC-1206-WA3 -- interference (contact) between the 16" line and a 3" line below hanger #RR0015.
- **7. Same line as 6 above -- interference (contact) between pipe and penetration #333.
8. Same line as 6 above -- a hanger designated for the Safety Injection System was observed on the CC line.
9. Same line as 6 above -- there do not appear to be any provisions for FO-4548 (orifice flange/plate assembly) -- pipe is installed in a straight run where this is located by iso.

* - PCRT followup indicates that there is a 5/16" clearance here. The PCVT concurs.

** - PCRT response indicates that CC-1206 spur "G" will be moved away from penetration #333 when FO-4548 is installed.

For both of the above asterisked items, the PCVT suggests that the project followup to determine the following information:

- Whether these specific situations will be evaluated via DER #85-018 (IRC item #238) "Unanalyzed Seismic Interactions", or
- If not, what method will be used to document acceptance of the installation.

EXHIBIT 17

PIPE SUPPORT/HANGER RECORDS

1. Hanger #CC-1206-HL5001

The hanger was installed and inspected to drawing revision 1. The Pre-CAT verification utilized drawing revision 2. The hanger is configured as per drawing revision 2, yet the records reviewed related to revision 1. There is no apparent documentation to reflect any rework/modification/reinspection to revision 2 of the drawing.

2. Hanger #CC-1206-HL5002

A "Component Support Inspection Report" was used in lieu of a "Piping Support Inspection Report". The report used does not have revisions for verification of piping location/elevation.

3. Hanger #CC-1206-HL5010

Same as both items 1 and 2 above.

EXHIBIT 18

MECHANICAL EQUIPMENT AND DOCUMENTATION

The following equipment was reviewed being stored in-place, and/or based upon review of maintenance activity documentation.

- 16" Motor Operated Valves (MOV) #V-15190, V-15182
- Safety Injection Accumulation Tanks #2N122NRC201-A, B and C
- Centrifugal Charging Pumps #2R171NPA101-A and B
- Reactor Cooling Pumps #1R131NPP101-A, B and C
- Component Cooling Water Pumps; and Chillers #3R201NPA101-A, B and C; and 3V112VCH001, 2 and 3

The following is a summary of PCVT observations made during reviews of the above listed equipment.

1. 16" MOVs #V-15190, V-15182 (stored in place)
 - a. V-15190 had no flange protection covers in place.
 - b. V-15182 had no hardened flange protection - only duct tape covering flange ends.
 - c. The heaters were activated on both MOVs (positive observation).
2. Safety Injection Accumulation Tanks #2N122NRC201-A, B and C (stored in place)
 - a. Tanks A and B had no internal nitrogen purge as required. Tank C had the required purge.

 Explanation provided regarding the lack of purge was that piping was being tied in. When questioned as to whether the purges would be reintroduced, the PCVT was advised that it was doubtful. (As these tanks are for Unit 2 application, there appears to be a good possibility of a lot of oxidation, as it could be several more years until they are turned over to startup.)
3. Centrifugal Charging Pumps #2R171NPA101-A and B (viewed in place)
 - a. Both Westinghouse 800 h.p. motors, when examined through the inboard and outboard bearing view ports, exhibited blistering and flaking of the coating on the bearing cavity walls.
 - b. Permanent Plant Maintenance information packet attached to the driver end, and the steel identification tag attached to the driven end had different tag numbers (packet shows #201B, tag shows #201A).

- c. The vendor manual recommends that equipment covering be sealed to the baseplate, that VPI-260 crystals be installed in the base, and that two (2) vent holes be placed at the extreme ends of the cover for ventilation.

Actual protection observed did not include crystals, and the covering was draped over the equipment loosely.

- d. It was observed that construction activity in the area of this equipment is increasing. The only protection being afforded the equipment was Griffolyn, and the PCVT recommends that additional protections be considered to preclude damage from inadvertent encounters with piping, conduit, HVAC, etc.

4. Component Cooling Water Pumps #3R201NPA101-A, B and C (stored in place)

- a. The vendor manual specifies that, if the motor space heater is energized, the motor should be uncovered. At the time of the PCVT review, the motor was covered with Griffolyn.
- b. The bearing housings were not entirely filled with mineral oil as specified in the vendor manual.
- c. VPI-260 corrosion inhibitor was not being used as specified in the vendor manual.
- d. The PCVT noted that the vendor manual makes reference to a water soluble preservative which was applied to the pump intervals at the factory, and feels that a review of the intervals would be appropriate to assess any degradation due to postulated oxidation.
- e. Same as comment #3.d. above.

5. Component Water Cooling Pump A - Motor - 800 h.p. (documentation review)

- a. There was no documentation in the package to indicate that an oil sample was taken and analyzed as per requirement listed on I&R E-0787, revision G.
- b. No evidence of QC involvement in monitoring maintenance activities.
- c. Lack of a date indicating when motor was released from the warehouse to the field made it impossible to determine as to when the internal space heaters should have been activated.
- d. Maintenance Action Cards (MAC) dated July 20, 1983, July 14, 1984, November 26, 1984, and May 25, 1985, reference the use of Gulf Harmony 32 lubricant. The Maintenance Instruction and Record Card (MIRC), however, specified the use of Gulf Harmony 46 lubricant.
- e. Some MAC cards referenced 4000 volt megger tests; others referenced 2500 volt tests (2500 is required).

6. Component Cooling Water Pump C (documentation review)

- a. Of the twelve (12) attributes to be reviewed, an Equipment Storage Inspection Report dated November 30, 1984, indicated that only one attribute had actually been reviewed (with minimal time/effort, all twelve could have been checked).
- b. Same as #5.d. above.
- c. Same as #5.e. above.

7. Reactor Coolant Pump A - Motor - 8000 h.p. (documentation review)

- a. The Westinghouse manual specifies that rotation frequency should be on a weekly basis. The Westinghouse Site-Specific Reviewing and Storage Manual specifies a monthly rotation. The disparity should be resolved.
- b. The Westinghouse manual states that upper and lower bearing oil should be periodically analyzed for water content. The last documented evidence of this having occurred was 1983.
- c. The lift oil pump is to be set at 1200 pounds prior to rotation of the shaft. There is no documented evidence of this having occurred.

EXHIBIT 19MECHANICAL EQUIPMENT - VENDOR MANUALS UTILIZED

| <u>Manual #</u> | <u>Equipment</u> | <u>Status</u> |
|------------------|----------------------------------|---------------|
| 0205(1)00026-BWN | High Head Safety Injection Pumps | 4 |
| 0205(2)00026-BWN | " " " " " | 4 |
| 4022-01002-ANT | Component Cooling Water | 1 |
| 8022-01002-ANT | " " " | 1 |
| 0205(1)00024-BWN | Charging Pumps | 4 |
| 0205(2)00024-BWN | " " | 4 |
| 205(1)00025-AWN | Low Head Safety Injection Pumps | 4 |
| 205(2)00025-AWN | " " " " " | 4 |
| 0125(1)00039-HWN | Reactor Coolant Pump | 1 |
| 0125(2)00037-HWN | " " " | 1 |

EXHIBIT 20HVAC HANGERS/SUPPORTS - HARDWARE ISSUES

I. The following installations were determined to be deficient as described.

A. EAB, Unit 1, elevation 35'

1. Hanger #S102 - This support, as installed, is entirely different than the support's "cut sheet" (status 1). The support is shown as attaching to a structural beam on the west side, and to a wall plate, installed with expansion anchors, on the east side. The support from the beam to the wall plate is shown as 4" x 4" tube steel with (2) 4" x 6" weld plates for attachment of the duct angles.

The configuration as installed has the duct stiffener welded to a plate which is 17" (the width of the duct plus the angle frame). The plate is, in turn, welded to a structural support beam which is installed between two (2) building structural beams.

2. Hanger #S050 - This support has stitch welding attaching the support angle to the duct frame angle which starts 4" from the bottom of the angle and ends 2 1/2" from the top. The welding requirement as per the cut sheet weld symbol is 2" of weld at 8" centers alternately on each side. This would require one weld at alternate ends per AWS A2.0-'68, section 406. The as-welded condition has two 2" welds in the middle 10" of the support angle with no weld at the alternate ends.
3. Hanger #S057 - Oversize weld; 4" weld length required, actual was 6".
4. Hanger #S107 - Oversize weld; 2" weld length required, actual was 4".

B. RCB, Unit 1, elevations 11'-3" and 52', or as indicated.

1. Hanger #S009 (at -5') - Oversize weld; 3/16" weld required, actual was 3/8".
2. Hanger #S010 (at -6') - Oversize welds; 2" of 3/16" weld required, actual was 3 1/4" of 3/8" weld one place, and 2 1/2" length at opposite bracket.
3. Hanger #S021 (at 25') - Oversize weld; 3/16" required, 3/8" weld deposited.
4. Hanger #S022 (at 32'-11") - Oversize weld; 3/16" weld required, actual is from 5/16" to 3/8".
5. Hanger #S027 (at -5'-6") - Oversize weld; 2" of 3/16" weld required, actual is 3" of 3/8" weld.

6. Hanger #S003 - Oversize welds; 1 1/2" weld length required, actual was 2 1/4" (2 places).
7. Hanger #S004 - Oversize welds; 1" weld length required, actual was 2" (3 places).
8. Hanger #S021 - Oversize weld; 1" weld length required, actual was 2".

C. FHB, Unit 1, elevations 68', 89'-6" and 93'

1. Hanger #S016 - Oversize weld; 4" weld length required, actual was 4 3/4".
2. Hanger #S013 - Oversize weld; 3" weld length required, actual was 3 3/4".
3. Hanger #S003 - Undersize weld; 6" weld length required, actual was 5 5/8" (NCR #CH-00745 issued - no further action). Also, oversize weld; 2" weld length required, 2 3/8" and 3" actually exist; 3/16" fillet required, 1/4" and 3/8" actually exist.
4. Hanger #S007 - Oversize weld; 2" long x 3/16" fillet weld required, actual was 2 3/4" x 3/8".
5. Hanger #S009 - Oversize weld; 2" weld length required, actual was 2 3/4".

EXHIBIT 21

HVAC HANGERS/SUPPORTS RECORDS

A total of twenty-five (25) EAB-1 records packages were reviewed. Of these, nine (9) were determined to be deficient. Details of observations are as follow, and are discussed categorically as they apply to the perceived type of deficiency observed.

I. Design Document Control/Inspection

"Cut sheets" are the documents utilized for fabrication/ installation of hangers. These are utilized in a "status 1" from BEC Engineering.

Review of the cut sheets in RMS for supports #S102, S053, S057, S099 and S108 indicated that applicable FCRs (#CH-01782, CH-01353, CH-00468, CH-01097 and CH-01094, respectively) were neither incorporated into, nor referenced on the cut sheets, resulting in a condition where the as-built configuration (as per the FCRs) was not accurately depicted by the records in the vault, which are intended to represent the installation as installed and inspected.

II. Inspection

A reverification inspection of welding on supports #S050, S080, S115 and S116 was performed three months after the use of an "AWS Checklist" was incorporated into the procedure QCP-10.21.

Review of these reverification records indicated that, contrary to procedural requirements, these checklists were not utilized. The reviewer for support #S080, as a matter of fact, made a notation which stated "no AWS Checklist required". It was noted that support #S050 was completely removed, reinstalled and reverified, with no checklist having been used. Also noted was the fact that the records for the reverification did not indicate that the stitch welding problems with hanger #S050 (reference Exhibit 20) were identified by the QC inspector.

EXHIBIT 22HVAC HANGERS/SUPPORTS - PROCEDURE REVIEW

The Ebasco Quality Control procedure entitled, "HVAC Duct/Hanger Installation Inspection", QCP-10.21, revision 4 with PCR #2, was reviewed against the requirements of specification 5V279VS1003, revision 4 (with all applicable changes). Comments are listed below for consideration of improving the "workability" of the procedure. Comment "E" is of particular concern due to the direct relationship between the lack of direction for weld size inspection and subsequent documentation or results, and field welds found to be outside of the allowed tolerances but accepted by QC Inspection.

| <u>Comment #</u> | <u>Paragraph</u> | <u>Comment</u> |
|------------------|------------------|---|
| A. | General | The specification requirement (paragraph 5.2) that, "... all safety class ductwork shall have safety class supports . . .", is addressed in the procedure but not in any applicable inspection report form where compliance could be documented. |
| B. | General | The specification restriction (paragraph 3.2.2.2.F) prohibiting burning to enlarge holes is not addressed by the subject procedure. |
| C. | 5.3.4 | The procedure's reference to paragraph 3.2.2.2 of specification 5V279VS1003 for the correction of holes, which in turn references paragraph 5.5 of specification 3A01OSS0030, could become difficult for the responsible QC inspector to follow. |
| D. | N/A | The specification requirement (paragraph 3.2.2.5.D) which states that, "... methods for removal and rework of installed supports be described in the applicable Constructor Field Construction procedure", is only addressed in the subject procedure as a reference back to the specification. |
| E. | Attachment E | Acceptance criteria for weld size (length, undersize, oversize) is not addressed in QCP-10.21, nor on the applicable inspection report form. AWS Weld Inspection procedure QCP-9.5 does address acceptance criteria for over/undersize welds, but it does not clearly provide for an accept/reject checkpoint on any applicable inspection report form. |

EXHIBIT 23HVAC INSTALLATION OBSERVATIONS

A total of twenty (20) installed HVAC duct pieces were reviewed in the Unit 1 EAB. The following specific items were reviewed, and observations corresponding to them are provided. It should be noted that none of the 20 installations had yet been accepted by ESI QC.

Drawing #/Duct piece #Observations

Drawing 5V111V0056-B-ID/
Duct pieces 17, 225, 226,
227, 266, 267, 268, 269,
402

- Sealant not visible around huck bolts joining closure plate to #402
- Several bolts loose between #225 and #226
- Trash (i.e. - cans, rags, paper) was observed inside #402
- Several conduit pieces were being stored inside #17
- Access door #1-6-0056-271 is resting against hanger and cannot be removed
- Use of H. B. Foster sealant - refer to Exhibit 2

Drawing 5V111V0056-A-ID/
Duct pieces 030, 031, 032,
033, 036, 037, 038, 112,
113, 497, 499

- A 1/4" gap was observed between flanges joining #112 and #113

The PCVT did not determine as to whether any of the items reviewed had been offered to QC for inspection. If so, the conditions observed could be considered as being construction inadequacies. In any event, the observations of trash and conduit inside ducting further substantiate previous PCVT identification of generic deficiencies in the area of interim storage/staging and widespread problems regarding housekeeping.

EXHIBIT 24

ENVIRONMENTAL QUALIFICATION - DUCT SEALANT,
BISCO FLEXIBLE CONNECTIONS

Specification 5V279VS1003, revision 3 (since superseded), specified the use of duct sealant #32-14, manufactured by the H. B. Fuller Company, or by Dow Corning Silicone Sealer #999, or by a Bechtel approved equivalent.

Specification 3V279VS1000, revision 7, specifies the use of Dow Corning Silicone Sealer #999, or a Bechtel approved equivalent.

A review of the Wyle Procedure/Plan #58960 for ductwork sealant and gaskets revealed that provisions exist for qualification of the Dow Sealer #999, and that the document has a "Status 2" (work may proceed pending resolution of comments) from BEC Engineering. The document does not contain qualification information or an Engineering review status for the 32-14 sealant manufactured by the H. B. Fuller Company. Also, no documented evidence was provided to the PCVT which would indicate that the 32-14 sealant is an "approved equivalent".

Intermech, Inc., purchase order #0730 was issued on April 17, 1984, to procure 125 eleven (11) ounce cartridges of 32-14 duct sealant. Interviews with BEC Contracts personnel indicated that this sealant was used by ECI until the time that specification 5V279VS1003, revision 3, was revised.

The PCVT observed the use of 32-14 sealant for huck bolt installations between duct pieces #266 and 269 (drawing 5V111V0056-B-ID). The amount of sealant used in this application was minimal. Accountability for usage of the 125 eleven ounce cartridges may not be possible if the sealant was used as a gasket adhesive.

The PCVT considers this to be an open item, and recommends that actions be taken to determine the acceptability of this sealer from an environmental qualification standpoint. If it is (or had already been at the time of deletion of this sealant from specifications) determined that the sealer is not acceptable, nonconforming conditions will most likely exist and accountability/traceability of the sealant will have to be established. The reason for deletion of this material from the specification should be determined. If the reason is found to have been due to the material's unacceptability, it must be concluded that Engineering was remiss in not ordering a backfit for sealant which had already been installed.

Another issue identified by the PCVT related to the environmental qualification of BISCO Flexible Connections.

Specification 3V279VS1000, revision 7, requires in part that, "Environmental test procedures and test reports for flexible material shall be submitted for Bechtel review for flexible connections used in quality class 3 ductwork." This requirement was later changed (by SCN #25) to indicate that testing would be accomplished by Bechtel.

(When requested, documented evidence was not provided to the PCVT to indicate compliance to this requirement (by any organization) for flexible connections manufactured by BISCO (SGR-600 flexible silicone rubber seal). Intermech, Inc., purchase order #1209 dated November 14, 1984, and change order #1 dated March 22, 1985, indicate procurement of 1800 yards of this material (note: change order #1 also deleted the QA note for environmental qualification).

The PCVT considers this issue to be open also, and recommends that actions be taken to obtain proof of this material's acceptability from an environmental qualification standpoint. If its acceptability has not yet been determined, then it must be assumed that BEC Engineering is allowing the usage of it based on a risk assessment, the prudence of which will be ascertained after the required environmental qualification test results exist.

EXHIBIT 25

RUSKIN FIRE DAMPERS

Reference: ST-HL-AE-1248 dated June 14, 1985, "Final Report Concerning Failure of Fire Dampers to Close"

The above reference describes the corrective action and recurrence control measures which will be implemented to resolve the problems associated with Ruskin NIBD-23 model curtain type fire dampers provided for STP.

The PCVT observed an incidence where five (5) fire dampers failed to fully close during simulated tests by the constructor. As a result, NCR HH-00767 was initiated by ESI. Reverification tests were conducted on two (2) of the 5 fire dampers, and results were witnessed by BEC Engineering and QA personnel. The retests of the 2 fire dampers resulted in the satisfactory closing of the fire damper blades. Consequently, the NCR is pending evaluation and revision to report the latest test results.

Additional investigation by the PCVT identified the following concerns:

1. NCR HH-00767
The initial testing reported failures of damper blades to fully close on five (5) fire dampers. The testing method used consisted of wiring the damper blades closed and then severing the wire with side cutters to simulate fuse link melting and damper blade closure. This method is not consistent with the supplier (Ruskin) procedure E512, revision 1, "Operation and Maintenance of NIBD-23 Curtain Type Fire Dampers," which recommends either melting the fuse link or unhooking the S-hook and release of the blade package by hand.
2. Ruskin procedures E512, revision 1, "Operation and Maintenance of Curtain Type Fire Dampers," and E511, revision 1, "Installation Instructions - NIBD-23 Curtain Type Fire Dampers," have not been reviewed by BEC Engineering. The document status by Engineering on October 22, 1984, is Status 4, "Review not Required." Specification 3V279VS1000, paragraph 5.4, requires test procedure approval by Bechtel.
3. Ruskin procedure E512, revision 1, requires that, "All fire dampers must be provided with suitable access doors and duct clearances to allow accomplishment of these functions (installation inspection, periodic inspection and fusible link replacement) without removal of duct. (This is a requirement of the National Fire Code - NFPA-90A.)

Specification 3V279VS1000, revision 7, requires that, "Suitable access doors shall be provided by the contractor for access to, and visual inspection of, the fire dampers."

Contrary to the above, notations by reviewers on information copies of procedure E511, revision 1, imply that the design of ductwork in all cases does not allow access to fire dampers, or access without removal of duct.

PCVT recommendations:

1. Bechtel Engineering to review the appropriate fire damper test procedures for acceptability. If the procedures are acceptable, the permission to proceed code should be "Status 1". If the procedures are not acceptable, reconcile comments through the standard review process.
2. Determine if the test procedure and test results reported in NCR HH-00767 are in compliance with a Bechtel approved procedure. Reconcile the status and validity of the NCR.
3. Determine if the design is adequate for accessibility of fire dampers, and likewise is in compliance with the applicable codes and standards.
4. Resolve differences between the supplier's test procedure requirements for accessibility and design requirements of the codes and standards imposed by the specification.

II. Electrical/Instrumentation and Controls (E/I&C)

A. E/I&C Systems

1. DJ System

The PCVT performed a detailed review of the DJ System (125V DC battery system), the first safety-related system to be turned over to HL&P Startup. The following is an overview of PCVT observations. Specific observations with regard to both hardware and records are detailed on Exhibits 27 through 31. Exhibit 26 provides a breakdown of the hardware-specific observations by type of problem.

Documents utilized by the PCVT during the DJ System review included, but were not limited to, the following:

Specifications (including all applicable changes)

5E189ES1007, revision 3
5E189ES1004, revision 3
5E189ES1080, revision 2
3E239ES0045, revision 2
5A230ES1008, revision 5
3E239ES0047, revision 1

Procedures (including all applicable changes)

QCP-10.17, revision 1
QCP-10.18, revision 1
CSP-40, revision 3

Drawings, EE-580 output (as applicable)

PCVT overview of work areas and activities in the Electrical Auxiliary Building resulted in observations of cables which had been pulled, but not terminated, and which were being supported by rope, wire, hung on cabinet doors, or not being supported at all. Craft personnel were observed standing in cable trays. Also, welding and grinding activities were observed over trays and cabinets without benefit of coverings for protection.

It should be noted that, according to information available, all items in the DJ System which were reviewed by the PCVT had already been accepted by ESI QC.

Conditions observed at the ten (10) and thirty five (35) foot elevations were, on a general basis, inadequate. Housekeeping in the control cabinet area was judged to be poor in that dirt, trash, banana peelings, wire clippings and cable pulling grease were found on the floors. The insides of cabinets and trays had an accumulation of dirt, with one cabinet being used as a storage area for shelves. Conductors were being tied off without benefit of softeners behind them, which could cause jacket damage. Instances of loose terminations were observed, as were conductors being routed too close to other wires, coils, etc. In most cases, the bundles were trained properly inside cabinets.

Review of like cabinets and associated DJ System equipment installed at elevation 60' resulted in observations which were quite different from those made at the 10' and 35' elevations. The area was clean, inside and out. Tie-offs had cushioning materials behind them, terminations and crimping were good, and general workmanship was determined to be of good quality.

As previously stated, specific hardware-related observations are detailed on Exhibit 27. Due to the nature of the PCVT review performed, it is impossible to quantify the number of problems identified versus the total number of observations. It can, however, be concluded that construction workmanship is, in many cases, poor. Many of the conditions found on Exhibit 27 are more attributable to workmanship than to violation of specific acceptance criteria (reference details on the Exhibit).

An area of apparent deficiency was identified with regard to the adequacy and/or timeliness of design change interface/notification to the field. Details of this concern are explained on Exhibit 28.

An area of concern was also identified with regard to the in-place protection (sealing) of unterminated, cut ends of conductors. Details of this concern are explained on Exhibit 29.

A question with regard to maintenance of the DJ batteries after system turnover, but prior to area turnover was raised, and is detailed on Exhibit 30.

A total of twenty seven (27) DJ System documentation packages were reviewed, with the problems being identified with all (27) packages. The PCVT considers the types of problems observed to be generic and recommends that the project address the issue in this manner. Details regarding the DJ System records observations are found on Exhibit 31.

During PCVT discussions with ESI QC personnel, it was stated that QC personnel had a concern with regard to the vehicles by which they could identify and document observed procedural violations. The PCVT was advised that QC personnel were under the impression that NCRs and DNs were the only deficiency documents available, and that they had, in the past, attempted to document procedural violations on those documents. They were, probably appropriately, instructed not to document these on an NCR or DN unless a hardware deficiency resulted. The PCVT received indications that QC personnel are now of the feeling that they are to only address hardware issues, and that they should not concern themselves with observed violations of procedural requirements. The PCVT recommends that QC personnel receive a re-indoctrination with regard to everyone's responsibility to identify procedural violations (e.g. - conditions adverse to quality), and that they should notify QA of programmatic deficiencies so that appropriate deficiency documentation (e.g. - SDR) can be generated to ensure that the deficiency is corrected and any necessary recurrence controls be installed.

A review of procedures utilized by Construction and QC has been done to verify their adequacy and "workability". Results of this review are found on Exhibit 32, and include details regarding observed violations of procedural requirements.

It should be noted that the PCVT received no feedback from the PCRT regarding DJ System observations at the time of Interim Report #2 issuance, and therefore generated SDR H-098 to document the conditions. Also generated was DEF #85-17. During preliminary review of the DEF and SDR, further clarification was obtained regarding each specific issue, its validity, and potential safety implication. Those valid hardware items were determined to be not of significance from a safety hazard standpoint (due to train-redundancies). Records-related observations were determined to be indicative of a program breakdown with indeterminate safety implications.

Resolution of all SDR/DEF issues will be under separate cover, but preliminary clarifications regarding each item are included on Exhibits 27 and 31.

2. PK System

The PCVT performed a detailed review of the PK System (4KV AC IE Power System). It should be noted that the projected turnover date for this system from Construction to Startup was May 17, 1985. As of June 4, 1985, the system had not been turned over, and a format SYS DAO report dated May 24, 1985, indicated that this system was approximately 25% complete.

The following is an overview of the PCVT observations, listing the areas/items reviewed along with the corresponding observations made. Specific notations with regard to records are detailed on Exhibit 33, and were included in SDR H-098.

Documents utilized by the PCVT during the PK System review included, but were not limited to, the following:

- Specifications (including all applicable changes)
5A230ES1008, revision 6

- Procedures (including all applicable changes)
QCP-10.17, revision 2
QCP-10.18, revision 2
QCP-15.1, revision 8
PSQP-15.1, revision 4

- Drawings, EE-580 output (as applicable)

Areas/items reviewed are as follows:

- EAB, Unit 1, elevations 10', 35' and 60'/ cabinets A1PKSGOE1A1 through 1A14, C1PKSGOE1C1 through 1C14, and B1PKSGOE1B1 through 1B14; plus associated cables, terminations and applicable verification documentation (QA records).

Of nineteen (19) cables reviewed at elevations 10' and 60', two (2) conductors were observed as being terminated on the incorrect posts. Another two terminated connections from these 19 cables were found to be inadequate. Deficiency Notices (DNs) have been written for each of these conditions. The PCVT noted the fact that QC witness points to observe the termination being accomplished had been bypassed by Construction. It is the opinion of the PCVT that, had these witness points been accomplished, the possibility exists that QC could have observed the inadequate terminations and had appropriate corrections made which would have eliminated the need for issuance of the DNs.

Ten (10) cables and their associated terminations from EAB, Unit 1, level 35', were reviewed. It was observed that all have been pulled, trained, supported and terminated with a high quality of workmanship. The only discrepancy observed was with regard to the fact that the cabinets were not being kept clean inside.

At that point in the verification process (Interim Report #3), the PCVT observed that housekeeping on all work elevations appeared to be steadily improving with the exception of the inside areas of the cubicles at elevation 10'. The condition inside these cubicles was found to be quite bad, in that cigarette butts, cans, bolts, nuts and other debris were littered throughout. One cabinet was observed as being used for a storage area.

With regard to in place protection (note that this had already been addressed by the PCVT, and observations are documented on SDR H-097), the PCVT observed that glass enclosed instruments on the front side of six (6) cubicles of BIPKSGOE1B have no protective covers, and as a result two have been broken, with NCRs having been written to document the condition.

The PCVT observed the fact that a number of the aforementioned cabinets had hold tags attached to the cabinets themselves, rather than the actual items within the cubicles which had been rejected. According to the existing requirements in Ebasco QCP-15.1, revision 8, paragraph 5.6, the only way that work could be accomplished on these cubicles would be with a conditional release. It was observed that work was actually in progress on the cubicles although the affected rejected items were not being worked on. Although the PCVT did not consider this to be detrimental to the quality or the nonconformance control of the actual items rejected, it was recommended that the practice of writing NCRs and affixing hold tags to the entire cubicle rather than to the actually rejected items be discontinued so as to eliminate the possibilities of questions such as those which were raised by the PCVT. Response from the PCRT on this issue simply stated that no procedures were being violated. The PCVT does not take issue with this, but its recommendation as previously stated remains unchanged.

An area of concern was identified with regard to an apparent usage of excessive amounts of cable for jumpers between each of the cubicles (A1PKSGOE1A1 through 1A14). Review of the EE-580 cable pull cards for these cubicles indicates that 100 feet of cable was used for the jumpers between each of the two cubicles. However, observations by the PCVT indicate that approximately twenty-four (24) feet of cable should have been adequate to accomplish the connections. This would leave approximately seventy-six (76) feet of cable which would not necessarily be needed to make the jumper connections. It has been calculated that approximately 988 feet of unnecessary cable was used for each train of the thirteen (13) cubicles. With the three (3) trains in these cubicles, this amounts to nearly 3000 feet of cable which the PCVT does not feel was necessary to be used. A similar observation was made by the PCVT (no specific identification/location was made) regarding excessive use of cable, in that a number of cable pulls of approximately thirty (30) feet in length were made for connections requiring approximately three (3) feet of cable, with the excess cutoff being discarded.

Based on these observations, the PCVT recommends that Construction take whatever actions are appropriate to ensure that only the amount of cable which is needed to accomplish a connection is used.

A total of fifteen (15) PK System documentation (records) packages were reviewed by the PCVT. Of these 15 packages, all were found to have one or more deficient attributes, indicating a rejectable rate of 100%. It should be noted that the results of the PK System records review have been included with those of the DJ System records review on SDR H-098. The combination of results of records reviews for these two systems indicates that of forty-two (42) packages reviewed, all 42 were deficient in one regard or another. Details regarding the PK System records observations are found on Exhibit 33. Those procedures listed on Exhibit 32 are applicable to the PK System and will not be reiterated.

3. DG System

The PCVT performed a review of the DG System (Standby Diesel Generator). The following is an overview of the PCVT findings, listing the areas/items reviewed along with the corresponding conditions observed.

Documents utilized by the PCVT during the DG System review included, but were not limited to, the following:

- Specifications (including all applicable changes)
- 3E239ES0045, revision 2
- 3E239ES0047, revision 1
- 5E189ES1007, revision 3
- 5E189ES1080, revision 2
- 5E189ES1004, revision 3
- 5A230ES1008, revision 5

Procedures (including all applicable changes)
QCP-10.17, revision 1

Drawings, EE-580 (as applicable)

In the EAB, elevations 10' - 60', the PCVT witnessed the pulling of cable CIDGD106A from the diesel generator H. V. cubicle. This appeared to be a well organized pull in compliance with QCP-10.17, revision 1, and was witnessed by an Ebasco QC inspector. The power cable was colored black and had colored tape attached every five (5) feet to identify which train was involved. In this situation, yellow tape was to be used for "C" train and red tape for "A". "B" train cable in this run had not yet been pulled. Note that black cable represents non-safety related cable in IE Systems. Investigation into the use of black cable indicated that the black cable being marked with red, blue and yellow tape was, in fact, purchased as Class IE cable, and was acceptable for use in safety related applications. This cable was traced back to the original reels. The purchase order (P.O.) numbers and cable identification matched the original purchase order. Authorization to add this method of color coding is provided by DCN no. 2, revision 0, with the contents added to drawing 9-E-NZ01-03 dated April 11, 1985. Based upon these observations, the PCVT concluded that no problem existed.

A similar observation, however, was made and determined to be a violation of procedure. It was observed that black cables which were marked with train "A", "B" and "C" color code tapes had been cut and respooled, but did not have QC accept tags (reference Procedure QCP-10.17, revision 2, 5.2.18). Upon investigation by the Response Team, these cables could not be located, and it must be assumed that they were installed by Construction subsequent to the PCVT observation. Follow up to this issue indicated that the cables, which had been procured under P. O. #6415 were, in fact, acceptable for class IE applications. This, combined with the PCVT verification that they were identified by train for installation, indicates that there is no probable cause to believe that a hardware deficiency exists. Therefore, no further action specific to this observation was considered to be needed. Although the PCVT observation cannot now be substantiated due to the assumed usage of the cable at issue, the fact remains that the observation was made. The project is advised that appropriate actions should be taken to ensure that procedural violations do not recur. These actions will preclude actions which would be needed if the condition were to be observed by another entity at some time in the future.

There were no DG related records reviewed by the PCVT, as activities were witnessed in process and no records would have been generated at that time.

4. VA System

The PCVT performed a review of the VA (120V AC 1E Vital) System. It should be noted that the established system turnover date for this system was May 10, 1985. As of June 6, 1985, the system had not been turned over. PCVT observations with regard to system completion indicated that approximately 90% of the required equipment was in place in varying stages of completion (e.g. - some equipment bolted and torqued; some only bolted; some welded to pads; some merely sitting on pads, unwelded). Approximately 70% of required cables had been pulled, but only 10% of required terminations had been accomplished. Many cables were observed coiled outside of assigned cabinets.

Areas and items observed during this system review are as follow:

EAB (Unit I), elevation 10' - two (2) 120V Vital CH I Dist.
Panels #A1VADP001 and A1VADP1201; three (3) Inst. Inverters
#A1VA1V001, A1VAV1201 and A1VA1V1202; and two (2) Voltage
Regulators #A1VARV001A (30KVA) and A1VARV002A (15KVA).

EAB (Unit I), elevation 35' - one (1) 120V Vital CH III Dist.
Panel #B1VADP1203; one (1) Instrument Inverter #B1VA1V1203;
and one (1) Voltage Regulator #B1VARV001B (15KVA).

EAB (Unit I), elevation 60' - two (2) 120V Vital CH IV Dist.
Panels #C1VADP002 and C1VADP1204; two (2) Instrument
Inverters #C1VA1V002 and C1VA1V1204; and one (1) Voltage
Regulator #C1VARV001C (30KVA).

Documents utilized during this review included, but were not limited to, the following:

Specifications (including all applicable changes)
4Z359ZS1039, revision 2
5A230ES1008, revision 6

Procedures (including all applicable changes)
QCP-10.15, revision 3
QCP-10.17, revision 2
QCP-10.18, revision 2

Drawings, EE-580 output (as applicable)

Pre-CAT Verification Checklists and NRC CAT Generic Matrix

The following is an overview of the observations made by the Pre-CAT Verification Team during the review of this system. It should be noted that this review dealt only with a walkdown to address equipment installation and items' identification. No review was made with regard to termination, inspection or records.

Installation of all the above referenced equipment at elevation 60' was checked against applicable drawings with no problems being observed.

A problem was identified with regard to the attachment of laminoid labels (nameplates) to equipment. As per paragraph 5.5.2.1 of specification 5A230ES1008, nameplates are to be attached to equipment using self-tapping stainless steel screws or nuts and bolts of the same size. During the review of equipment in this system, the PCVT noticed numerous instances where nameplates were attached with glue or double-backed tape, without screws or bolts, and were loose/peeling off the equipment. Feedback from the Response Team indicated that these nameplates may have been installed by suppliers of the equipment, and that the procurement specifications did not require the use of fasteners for the nameplates. Another possibility discussed was that ECI crafts were in process of installing the nameplates, and that these may have been temporarily fastened using glue prior to going back and installing the required fasteners enmasse. It should be noted that the PCVT has observed site personnel using the required fasteners, so this scenario is entirely possible.

In any event, the PCVT recommended that appropriate consideration be made with regard to procurement specification requirements for as-yet undelivered items; and that requirements commensurate with those in place on site be imposed on suppliers, as it is doubtful that glued-on nameplates will remain intact once installed and exposed to environmental conditions in the plant. Otherwise, much unnecessary rework will be required on site. Also, it was recommended that a backfit review of QC accepted equipment (installed) be made to install fasteners to nameplates so as to prevent later problems, and that the existing QCP verification attribute for fastened nameplates (which apparently is only being applied to site-installed items) be extended to all nameplates, regardless of by whom they were installed.

Further response on this matter from the PCRT was as follows:

"Laminoid nameplates installed by Construction are attached to the equipment in accordance with specification 5A230ES1008. Verification by the PCRT identified no problem with nameplate attachment. Per specification 5A230ES1008, Construction is required to attach equipment tags with the EE-580 location number, and a description of the load when given on a single line diagram. This requirement provides a remedy to what might be interpreted as a problem, and provides a response to the PCVT recommendation with regard to the subject."

The PCVT does not feel as if this response has addressed its recommendations with regard to procurement related activities and a possible backfit, and considers the issue remaining open.

Another observation made dealt with the welds of the pad for the Voltage Regulator at elevation 35'. The welds are rusted and will need to be cleaned and painted.

A review of QCP-10.15, revision 3, resulted in no comments.

5. EW System

The PCVT performed a review of the EW (Essential Cooling Water) Electrical/Instrumentation and Control (E/I & C) System. The turnover date for this system of May 17, 1985, has been reforecast for July 15, 1985. PCVT verifications on this system were limited due to the system's completion status. It was observed that, while approximately 90% of the system's equipment was in place, only about 5% of the required cables had been pulled, with approximately 1% of terminations having been completed.

Areas and items observed during this system review are as follow:

MAB (Unit I), elevations 10' and 28' - Essential Cooling Water Intake MCC-E1B3 Flow Transmitters #A1EWFT6853, B1EWFT6863, C1EWFT6906, C1EWFT6874 and C1EWFT6876.

Documents utilized during this review included, but were not limited to, the following:

Specifications (including all applicable changes)
5Z689ZS1027, revision 4
4Z519S1040, revision 3

Procedures (including all applicable changes)
QCP-10.13, revision 3, with PCR #1 dated February 20, 1985

The following is an overview of the observations made by the PCVT during its review of this system. It should be noted that this review dealt only with a walkdown to address equipment installation and items' identification. No review was made with regard to terminations, inspection or records.

The PCVT observed a misidentification of two conduits coming out of MCC-E1BC in the ECW intake room (train "A"). Conduit #N1YEBRS099 is labeled as being #A1YE1RJ006, and vice versa. These conduits are identified just before entering the concrete wall to the Screen Wash room. Subsequent reverification by the PCRT and PCVT revealed that no discrepancy now exists (the installation was in process at the time of the original observation).

The PCVT also observed that the tubing to the flow transmitters were not color-coded as required, and the identification tags on the base plates were missing (reference PCR#1 to QCP-10.13, revision 3). These flow transmitters were located in the Heat Exchanger room, MAB elevations 10' and 28'. PCRT response to this observation was that the installation was still in process. This response is acceptable to the PCVT.

A review of QCP-10.13, revision 3, was accomplished. Comments resulting from this review closely parallel others generated during review of inspection procedures for other activities/commodities. As with other procedures, it was determined the this QCP contains what the PCVT considers to be an excessive amount of reference to other documents for acceptance criteria, and not enough detail in the procedure itself. As an example, in 5.1 "Prerequisites", there are eighteen (18) documents listed (11 QCPs, 2 CSPs, 2 NDEs, 1 ASP and 2 WPP/QCIs) used with this procedure. Paragraph 5.1.1 states in part that, "Instrumentation installations shall be verified in accordance with the latest approved design drawings, design drawing amendments, Ebasco field sketches and Bechtel specification 5Z689ZS1027."

As understood by the PCVT, a QC inspector must, prior to performance of an inspection, determine which documents are applicable to the pending inspection and must then assemble the documents to determine what acceptance criteria applies by extracting the requirements from whatever documents in which they are found. As has already been stated, the PCVT does not feel that the practice of having the QC individual accomplish inspection planning is prudent, nor does it meet the intent of the STP Inspection Program as described in paragraph 10.3 of the STP Project QA Plan, Section 10, revision 2.

6. CC System

The PCVT accomplished a review of the CC (Component Cooling Water) System. The established turnover date for this system is September 12, 1985. PCVT observations with regard to system completion indicated that approximately 85% of the required equipment was in place, with 20% of the cable pulled and 3% of the terminations completed.

Areas and items observed during this system review are as follow:

EAB (Unit I), elevations 10' and 23' - Transfer SW Panel
A1PNZLP653' Isolation Relay Cabinet A1PNZLP659 and
Termination Cabinets A1PNETCA03 & A1PNETCA04 w/ Associated
Cables and Terminations.

Documents utilized during this review included, but were not limited to, the following:

Specifications (including all applicable changes)
5A230ES1008, revision 6

Procedures (including all applicable changes)
QCP-10.17, revision 2
QCP-10.18, revision 2

The following is a summary of observations made, with specific identification of affected items.

Three (3) of twenty-four (24) cables reviewed were observed as having loose terminations. These cables are:

- (Transfer Switch Panel A1PNZLP653) cable #A1CC01C1WC, white conductor terminating on TB39, Post #01.
- (Isolation Relay Cabinet #A1PNZLP659) cable #A1CC03C1SH, black conductor terminating on TB39, Post #03.
- (Isolation Relay Cabinet #A1PNZLP659) cable #A1CC14C1SD, red conductor on TB09F, Post #11.

Five (5) cables were observed as being of a color other than that which is required. These cables are (all in Isolation Relay Cabinet #A1PNZLP659):

- Cable #A1CC05C1SE, conductor called out for TB09F, Post #05, should be orange; actually is pale yellow.
- Cable #A1CC03C1SH, conductor called out for TB08H, Post #01, should be orange; actually is pale yellow.
- Cable #A1CC1YC1SD, conductor called out for TB09G, Post #01, should be orange; actually is pale yellow.
- Cable #A1CC24C1SE, conductor called out for TB08G, Post #07, should be orange; actually is pale yellow.
- Conductor for TB09H, Post #03, should be orange; actually is pale yellow.

One damaged termination lug (bent and cracked) was observed on cable #A1CC31C1SD, green conductor on TB08F, Post #04.

A number of cables were observed as having unidentified conductors (required - reference QCP-10.18, revision 2, 5.2.1.1.2). These are:

- (Terminated in Cabinet #A1PNETCA03) cables #A1CC01C1WC, A1CC05C1SC, A1CC09C1SC, A1CC11C3WA, A1CC20C1WA, A1CC21C1WC, A1CC22C1WD, A1CC23C1WG, A1CC24C1WG.
- (Terminated in Cabinet #A1PNETCA04) cable #A1CC20C1WA.

It should be noted that all of the items reviewed have already been accepted by ESI QC.

B. Cable Tray, Raceway and Supports

The PCVT accomplished a review of hardware and software related to cable tray, raceway and supports fabrication and installation. This consisted of an examination of installed items, inspection activities, documentation and verification records.

Documents utilized during this review included, but were not limited to, the following:

- Specifications (including all applicable changes)
 - 3E189ES1000, revision 6
 - 3E359ES8000, revision 6
 - 3E359ES8001, revision 10

- Procedures (including all applicable changes)
 - QCP-9.5, revision 5
 - QCP-10.30, revision 1
 - QCP-10.16, revision 5

The PCVT review of this commodity included evaluation of the following attributes: configuration, welding, separation, identification, coating, material traceability.

As of June 18, 1985, approximately 1864 supports had been accepted by ESI QC. The PCVT reviewed a total of fifty-five (55) tray hangers/supports which represents a sample size of approximately three percent (3%) of the total. Of these 55, problems or concerns were identified with eleven (11), or approximately twenty percent (20%) of the sample selected. There were also a number of observations made during this review, some of which pertain to inspection-related problems. Specific details regarding supports reviewed are as found on Exhibit 34.

Prior to and during the actual review of hardware, the PCVT observed that the number of design documents needed to be reviewed, plus the number of allowable options for fabrication and installation, made it difficult to discern exactly what acceptance criteria is applicable. For example, sheet #1 of drawing #58001, revision 10, has twenty-one (21) separate notes (many being options), and thirty-eight (38) different details, many of which have been added as revisions to address conditions observed in the field. The PCVT feels that a more concise method of providing design information could prevent the possibility of difficulties with the hardware due to what are perceived to be rather nebulous acceptance criteria.

The PCVT made the following observation with regard to material traceability of support/hanger material. The PCVT was advised that specific traceability is not possible on STP due to the fact that hangers are fabricated from bulk, safety related material, and that piece-to-piece traceability is not maintained. No further action was taken on this matter. However, it is noted that NRC CAT Inspections at other projects have addressed this verification item, and that STP can, in all likelihood, expect similar queries during its CAT Inspection.

The PCVT also reviewed a total of approximately 575 feet of installed cable tray in various locations within the Unit 1 EAB, plus a random review of selected conduit installations. A number of problems were observed, which included two (2) separation violations. Details regarding this review are as found on Exhibit 35.

An apparent document control related problem was identified with regard to documentation related to one hanger. Details regarding this observation are as found on Exhibit 36.

While AWS welding was found to be generally acceptable, there were three (3) problems noted. Welding related observations are also found on Exhibit 34.

A total of thirty-six (36) completed record packages for QC-accepted installations were reviewed in the STP-RMS records center. Of the packages reviewed, eighteen (18), or fifty percent (50%) of the sample selected, were determined to be deficient due to one or more unacceptable attributes. Details regarding record related observations are as found on Exhibit 37.

In addition to hardware and software reviews, the PCVT accomplished a review of the applicable inspection procedures, namely QCP-10.30, revision 1. This review resulted in the identification of a number of comments, some of which could be attributable for some of the actual hardware-related observations made in the field. Details regarding this procedure review are as found on Exhibit 38.

With regard to separation, the PCVT offers the following information.

Review of ten (10) CAT Inspection Reports at other projects during preparation for the Pre-CAT verification indicated to the PCVT that the NRC criticized every project reviewed in one regard or another (e.g. - violations, concerns, observations, etc.) for inadequacies in maintaining and/or verifying acceptable separation. These criticisms dealt with either inadequate design considerations, verification (failure to identify deficiencies) or perceived inadequacies regarding plans to verify separation compliance. As a result of the NRC's observations during CAT inspections, IE Information Notice (IN) #85-11 was issued on February 11, 1985. This IN provided an overview to all construction permit holders with regard to separation deficiencies, with suggestions that projects consider them as they may relate to their project (e.g. - STP), and that appropriate preventative measures be taken to minimize the possibility that similar problems would arise.

Based upon review of the actual CAT Inspection Reports and the resultant IN, the PCVT has concluded that the conditions observed at Comanche Peak by the NRC bear a close resemblance to conditions as they currently exist on STP. At that project, the NRC identified a number of areas where failure to maintain required separation existed, and attributed the conditions in part to that project's decision not to inspect electrical installations for physical separation until installation was essentially complete.

During PCVT verification activities on STP, two (2) separation violations were identified (discussed in Exhibit 35). Due to the very limited amount of installations available for review (for separation) at the time of the PCVT effort, it was not possible to obtain a broad overview for compliance in this regard. However, it should be noted that there will be a much larger sample available for review by the NRC at the time of the actual CAT inspection, and the PCVT feels that the project can expect a close review of this attribute at that time while identifications of failure to maintain separation requirements are likely. If current controls on STP remain unchanged, it is expected that the NRC will, as they did at Comanche Peak, attribute the failure in part to the apparent decision not to inspect electrical installations for physical separation until installation is essentially complete.

STP is not inspecting for separation attributes (as prescribed in FSAR Section 8.3.1.4) at the present time, and apparently does not intend to do so until (as was the case at Comanche Peak) installation is virtually complete. For example, ESI QCP-10.16, 5.1.7 with PCR #2, states that "Tray covers and separation barriers need not be installed for acceptance of cable tray. Covers/barriers/fire barriers will be inspected for compliance with engineering requirements prior to area turnover."

Aside from the fact that (in the PCVT's opinion) the project will, in all likelihood, be cited by the NRC for actual separation violations and related program weaknesses with regard to plans not to inspect for the attribute until a later date, the PCVT feels that this decision not to do so may not be the most prudent on the part of the project. It should be noted that current plans are to inspect for this at the time of area turnover, not systems turnover. All of the systems related to an area will be already turned over (postulated) to HL&P Startup. This inspection, when it occurs, will entail an extensive walkdown to determine where barriers are needed, and could possibly result in the identification of conditions of nonconformance where barrier installation (in lieu of physical separation) would not be possible. In any event, it is anticipated that a large amount of work will affect systems which have already been turned over as being complete and acceptable. This work-to-go will probably include much design work for barriers (possibly on a case-by-case basis, dependent on walkdown results), materials procurement, fabrication, installation and reinspection.

The effect of these activities being performed at the late stages of the construction phase could pose unanticipated problems (e.g. - additional costs and schedule delays), and the PCVT recommends that the project reevaluate its position with regard to this topic.

EXHIBIT 26
DJ ELECTRICAL SYSTEM

Observation/Quantity

* Cable Jacket Damage/(4) total observations

Loose Terminations/(2) total observations

* Improper Support/(6) total observations

* Protection/(3) total observations

* Double Crimping/(4) total observations

* Missing Parts/(1) total observation

* Loose Hardware/(1) total observation

Installation Problems/(2) total observations

* Bend radius violation - (1)

* Cable routing near coil - (1)

* Missing or Incorrect Identification/(2) total observations

* Cable Tray Overfill/(1) total observation

(For specific, preliminary clarifications regarding each item, refer to Exhibit 27.)

* Indicates identical or similar deficiencies having been identified by NRC CAT Inspections at other nuclear projects.

EXHIBIT 27

DJ SYSTEM
SPECIFIC OBSERVATIONS

1. Area/Items Reviewed:

Battery charger #A1DJBC047A, cabinet and associated cables at EAB elevation 10'; and cabinet #A1PMMCEA1Q1R and associated cables at EAB elevation 10'.

Observations:

a. Damaged cable jacket, (2) places:

1. Cable #A1DJ10C1SB jacket is cut by cabinet frame angle iron at the tie-off point where cable first enters cabinet (left side facing front of cabinet).
2. Cable #A1DJAAC1LB - phase "A" jacket is cut almost entirely through where cable enters and is tied off the protector lock ring.

DEF related investigations resulted in these observations being invalidated. Cable jackets are indented, not cut.

b. Loose terminations:

1. Cable #A1DJAAC1LB (in cabinet #A1PMMCEA1Q1R) terminations on phase "A" and "B" are loose.

DEF related investigations resulted in a determination that these terminations are designed to allow movement, no deficiency exists.

c. Improper support:

1. Cabinet #A1PMMCEA1Q1R - several coils of cable are attached with improper support.

DEF related investigations revealed that these cables are now terminated and properly supported. The condition, however, did exist, and construction should exercise more care in the in-process protection of pulled, but not terminated, cables.

d. Protection:

1. Tray #A1XE1FTWZB running over cabinet #A1PMMCEA1N1 has an unprotected rung, with two red cables falling out unprotected.

DEF related investigations indicate that this observation is valid.

2. Area/Items Reviewed:

Class 1E batteries and associated equipment/cables at EAB elevations 10' and 35'.

a. Double crimping, (2) places:

1. Cables #D1DJABC1LE and #D1DJABC1LA at elevation 10'.
2. Cables #B1DJACC1LL (2 pairs) at elevation 35'.

DEF related investigations revealed that these cables are 750 MCM size and require double crimping - no deficiency.

b. Missing parts:

1. Battery #58 (at elevation 10') had a filler cap missing.

c. Loose hardware:

1. Loose jumper bolt between batteries #44 and #45 st elevation 10'.

DEF related investigations resulted in determinations that both these observations were valid. Both conditions are now adequately controlled or corrected.

3. Area/Items Reviewed:

EAB elevation 10'; battery charger cabinet #A1DJBC047B, Auxiliary Relay Dist. Switchboard cabinet #11DJP1039A, cabinet # A1DJPL037A1A, battery charger breaker cabinet #A1DJPL0C7A2 and associated cables, conduits, trays, terminal boards and terminations.

Observations:

a. Damaged cable jacket, (2) places:

1. Cable #A1DJ10C1SC (in cabinet #A1DJBC047B) is tied off so tightly against the left side of the cabinet frame that the jacket is cut through approximately 40% of its thickness.
2. The phase "A" cable #C1DJAGC1LA (in cabinet #C1DJBC047G) is pulled tightly against the conduit protector cap and is cut through approximately 20% of its jacket thickness.

Same as items 1.a.1. and 2. - cables are not cut.

b. Loose terminations:

1. Cable #C2SB-F6 conductor (in cabinet #B1DJBC047E) was loose on termination board #15, post 8.

DEF related investigations confirmed this observation.

c. Improper support:

1. In cabinet #11DJPL039A, red cables - positive and negative #1ADJAAC1LD - neither are properly supported.
2. In cabinet #A1DJPL037A1A, all cables common to terminal board #1 are not supported anywhere except at their termination point.
3. Same as c.2. above - no support provided for cables that drop out of conduit and into the raceway for a distance of (6) feet.
4. In auxiliary relay compt. #C1DJPL037D1A, all cables are neatly trained, but the terminations are supporting all of the weight of the cables.

Items 1, 2 and 4 were discounted from IRC consideration due to their being open to interpretation. It was concluded that the PCVT interpretation may have been overly conservative.

Item 3 is considered to remain open. As a result of the PCVT observation, ESI generated a DN to document a 3'-1/8" "point-to-point" dimension from the cable's exit to entrance points. When questioned as to the disparity between the PCVT quoted 6 foot dimension and the cited DN condition, ESI QC stated that they do not check the actual length of unsupported cable; rather, they check point-to-point dimensions. It was stated that direction to do so was from BEC Engineering. Subsequent discussion with BEC Engineering resulted in statements that directions of that nature were never given.

Regardless of the direction (or lack thereof), the PCVT does not feel that the practice of measuring point-to-point dimensions and disregarding the actual length of unsupported cable is acceptable, and recommends that the project follow up on this issue.

It should be noted that the actual 6 foot cable observed as being unsupported by the PCVT was a vertical run, and it was determined that no deficiency exists.

d. Protection:

1. Distribution panel #C1DJPL039C was being used to store several shelves and other hardware.

DEF related investigation revealed that all items stored in the panel were destined for use in that panel and that no deficiency exists.

e. Installation problems:

1. Bend violation - in cabinet #11DJPL039A, cable #1A1DJAAC1LD (positive) has a bend violation as it approaches the termination point.

Actual measurement of the bend radius (reproduction) indicated that the stated violation does not exist.

2. Cable routing - in cabinet #C1DJBC047G, cable #D1DJ10C3SB is routed so closely that it nearly touches the upper left (south) coil. It should be noted that the heat that this coil will produce could melt the cable jacket. Also, this is the only cabinet in which the cable was routed in this manner - others of a like configuration are routed well away from the coil.

Subsequent investigations revealed that the "coil" is actually a resistor with attachment leads rated at 125°F, so the possibility of melting does not exist. This observations was, however, indicative of undesirable workmanship.

It should be noted that the cable in question was moved subsequent to the PCVT observation.

f. Identification:

1. In cabinet #A1DJBC047B, terminal block #20 was not identified.

Subsequent investigations confirmed this observation.

2. In cabinet #B1DJBC047F, terminal block #20 was actually identified as #16.

Subsequent investigations confirmed this observation and the cause of the condition (design change). Refer to Exhibit 28 for details of an issue regarding design control inadequacy.

4. Area/Items Reviewed:

EAB elevation 10'; termination cabinet #A1PZLP659B.

Observations:

a. Improper support:

1. Cables dropping out of tray #B1XE3FTW XD are coiled, but not supported.

b. Protection:

1. Cables dropping out of tray (same as a.1. above) are twisted and piled upon each other, bending the tray down at its exit point.

c. Cable tray overfill:

1. Same cable and tray as a.1. above - tray is overfilled.

Investigations subsequent to these observations resulted in the following determination. The existence of an actual deficiency (violation of specific acceptance criteria) is open for interpretation. This will not be pursued any further by the PCVT.

However, it was generally agreed that the conditions existing are clearly indicative of poor workmanship. These types of conditions will almost certainly be criticized by the NRC during the actual CAT inspection, and the project should take appropriate actions to upgrade the overall level of workmanship related to cable installation.

EXHIBIT 28DESIGN CHANGE INTERFACE/COMPLETION STATUSING

- I. The PCVT identified apparent anomalies with regard to cable routing, applicable EE-580 cards, and an EE-580 printout (Format 155H dated May 3, 1985) which was reported to show status of installations. Specific observations are as follows:

Area/Items Reviewed:

- EAB elevation 10', termination cabinet #A1PNZLP659B
- EAB elevation 35', termination cabinet #B1PNZLP660A B & C
- EAB elevation 60', termination cabinet #C1PNZLP661A B & C

Observations:

- A. As per applicable EE-580 card, revision 5, cables #A1DJ10C1SB and #A1DJ10C1SC were pulled from cabinet #A1DJEC047B to cabinet #A1PNZLP659. According to the Format 155H printout, however, these cables should have been routed to cabinet #A1AMTB001.
- B. Similarly to 1. above, cables #B1DJ10C2SB and #B1DJ10C2SC are pulled and coiled outside cabinet #B1PNZLP660A B & C, when the printout shows that they should be routed to cabinet #B1AMTB001.
- C. Similarly to 1. above, cables #C1DJ10C3SB and #C1DJ10C3SC were pulled and coiled outside cabinet #C1PNZLP661A B & C, and the printout shows their termination point to be cabinet #C1AMTB001.

Input from PCVT escorts and the response team contacts indicated that EE-580 card revisions existed to describe the needed changes, but these could not be produced. Discussions with several individuals indicated that these may not be isolated occurrences - that construction often cannot complete a pull/termination due to stated design changes which may take a considerable amount of time to appear. In the meantime, many partially completed pulls will remain unfinished, and the cables will remain coiled in place awaiting new routing/termination instructions. (Note that the PCVT observed numerous instances where unterminated coils of cable were lying in trays, hanging by rope and wire, and hanging from cabinet doors.)

The PCVT concern is based upon a number of potential problems which could arise from an inconsistency between the EE-580 data base and the cards. These topics were originally reported in Interim Report #2 with a response due date of June 28, 1985. None was received and the PCVT considers the issue to remain unresolved. It is recommended that the project follow up on this issue with regard to the following topics:

- Timeliness of interface between updating the EE-580 data base and issuance of a revised card to the field.
- Notification process to the field which would induce Construction to stop a cable pull to await revised routing/termination instructions via a revised EE-580 card (indications to the PCVT are that this is an informal notification).

- Interface between the EE-580 and Master Completion List (MCL) data bases (e.g. - Does the MCL pick up an impending design change/rerouting requirement, or does the possibility exist that HL&P Startup could accept turnover of a system based on the MCL status only to find later that rework is needed? And if so, how would that later notification be effected?)

II. Design Change Control

(Refer to item 3.f.2. of Exhibit 27.)

The condition identified was that a terminal block to have been identified as #20 was actually identified as #16. Investigations subsequent to this observation revealed that the condition does, in fact, exist, and that its cause was a change in identification after the original installation and QC acceptance.

Followup by the PCVT to verify a "closed loop" to ensure that needed changes get made revealed an "open loop" in this regard, plus an apparent design control deficiency.

Although data was provided to substantiate the revision to the EE-580 card, no evidence was provided (e.g. - the actual revised card and a CCP) to support the statement that required field changes would be made. The PCVT considers this to be an open item requiring project attention.

While reviewing evidence which was presented to prove that actual EE-580 card revisions were made, the PCVT identified what appears to be a failure to enact design changes in accordance with approved design control procedures which are endorsed by the STP QA program and include the control features of ANSI N45.2.11.

The document provided to substantiate the EE-580 change was Change Concurrence Transmission (CCT) #1384 dated (apparently) April 25, 1985. This CCT provided instructions that Block 16 on the installation (EE-580) card should be changed to Block 20 to reflect field condition; that the condition was reflected on the vendor drawing. The CCT did not indicate the date and time of submittal, date required, or the EE-580 coordinator (space for all these entries was provided on the form). In the bottom portion of the form, a computerized-type printout indicated activities (request for change and its completion) related to this CCT as being questions and answers, which is not an accurate description.

When questioned as to the origin of this document and its governing procedure, the PCVT was provided (by BEC Engineering) a copy of desktop instruction for the CCT process. This desktop instruction (DTI) is unnumbered and unapproved. The entire premise of the CCT system as described in the DTI is as stated in paragraph 4.1 (" . . . communication tool . . . to provide . . . a media to transmit design questions and answers . . . ") and throughout is to ask and answer questions, not effect changes. The only place where this is discussed is in paragraph 5.2.4 ("When the answer requires design engineering to alter the EE-580 Database, the . . . answer shall state that an input sheet has been prepared and a forecast date . . .").

Prior to discussing PCVT conclusions regarding this matter, the following bears mention. The PCVT is aware of the fact that there exists a degree of disagreement between various project entities regarding the design related classification of EE-580 output (e.g. - Is it a design document?). Based upon observations made during the Pre-CAT verification, the PCVT has concluded that EE-580 output is clearly design output and therefore must be controlled in accordance with established design control procedures. EE-580 output contains information which is not found on the approved design documents (e.g. - "single lines") used as input to the data base. Examples are type and size of raceway, cable, terminations, etc. This EE-580 output is used to accomplish actual installations and inspections, and is signed off by QC and retained in RMS to serve as verification documentation (QA record) of the installation.

Based on the above determination and the data provided to substantiate the specific change at issue herein (note that the PCVT observed a computer printout which indicated that the CCT process is the common method of effecting EE-580 changes), the PCVT has concluded that a number of QA program deficiencies exist.

The CCT document is used to effect design changes, is not controlled by an approved procedure, itself receives no review and approval and is not trended for design deficiencies in accordance with the established corrective action program. Also, an apparent design document control deficiency exists in that the specific EE-580 card in question was not located, nor were existing controls (e.g. - CCP) apparently implemented to ensure that needed modifications to installed and accepted installations are implemented.

Based upon these observations, the PCVT recommends that the entire EE-580 process be scrutinized from a QA programmatic compliance standpoint, and that appropriate actions be taken to effect compliance.

EXHIBIT 29IN-PLACE PROTECTION

The PCVT observed that, on a generic basis, the cut ends of unused conductors are not being sealed. Specification #5E189ES100^A, as amended by FCR #CE-05023, does not require that these ends be sealed. The ESI QCP-10.18, revision 2, paragraph 5.2.6.1.2, however, makes the sealing of unused conductor ends a required verification attribute. This QC activity is obviously not occurring, although the sealing is no longer required (reference FCR).

The PCVT has two basic concerns regarding the subject of sealing the cut ends of unused conductors.

1. FCR #CE-05023 (dated March 19, 1985)
The PCVT does not see the merit of deleting any requirement to seal unused conductors. The stated reason for making the change on the FCR was "... to clarify the ... requirements for unterminated conductors ..." which does not indicate a reason to the PCVT. As seen by the PCVT, the act of sealing unused conductors is beneficial, and can prevent possible shocks to personnel, as well as providing a barrier against possible intrusion of moisture inside the jacket which could result in degradation of the conductor. It should be noted that the NRC has identified deficiencies in this area at other plants during CAT inspections.
2. QCP-10.18, revision 2 (dated May 7, 1985)
Item 1 above notwithstanding, the specification change which deleted the requirement to seal cut ends was effected on March 19, 1985. Revision to the QCP on May 7, 1985, did not pick up this change and make appropriate changes. Although it is obvious that cut end sealing is not occurring, and that it is not required to be done, the QCP requires that QC verify sealing, which is apparently not happening, exposing QC to criticism for not accomplishing a procedurally-required activity (although the activity need not be performed according to applicable design documents).

Response to this issue was as follows, and is considered to be adequate by the PCVT.

"Technically, the deletion of that requirement is due to the fact that the spare conductors are located and contained in a controlled environment where HVAC and/or space heat is applied. This controlled environment precludes the presence and possible intrusion of moisture between the jacket and the conductor. As for personnel's safety and protection, the spare conductors will not be energized, and therefore, would pose no safety or shock hazards.

In conclusion, in performing such an activity (sealing the ends of spare conductors) in an environment and condition as described above, will not serve the benefits in the PCVT concern. Additionally, it would burden the project with unnecessary costs.

It should be noted that CSP-8, paragraph 8.01.10 and QCP-10.18, paragraph 5.2.6.1.2, have been revised to state what is stated in the FCR."

EXHIBIT 30GENERAL COMMENT REGARDING MAINTENANCE OF 1E BATTERIES

As per specification #3E239ES0045, Rev. 2, 3.2.1 and Table 1, the designed operating temperature range for 125V DC batteries is 65°F (min.) to 77°F (max.). The batteries on STP have been maintained in accordance with the manufacturer's recommendations, which contain a maximum temperature limit of 90°F.

The DJ system batteries are installed, and turnover from Construction to Startup is impending. Information is required with regard to how these batteries will be maintained after turnover of the system, but prior to turnover of the area, which will be providing the required environmental controls.

When reported in Interim Report #2, a written response was requested by June 28, 1985, and was to address project's intentions regarding maintenance of the batteries after they fall under Startup and Operations jurisdiction, including the following specific issues:

- Temperature at which the items will be maintained
- Rationale for selection of that temperature
- Method of maintaining that temperature

It was noted that readings taken by the pre-CAT team at 2:30 p.m. on May 14, 1985 indicated that the ambient temperature in the EAB battery room at elevation 60' was 90°F -- the upper limit of the manufacturer's recommendations. It was also noted that this is an area of NRC interest during CAT inspections, and that they have cited other plants for deficiencies in this area.

The requested response was not received, and the PCVT considers this to remain an open issue. Air conditioners have been installed (apparently by ECI) in the battery rooms, and the ambient temperature is being maintained low (approximately 72°F), but the following issues should be formally addressed:

- The above three original issues
- Organizational responsibility/interface for maintenance after system turnover, but prior to area turnover (e.g. - if ECI will continue to maintain area environment, has a written interface/responsibility been established?)

EXHIBIT 31DJ SYSTEM RECORDS

A total of twenty-seven (27) documentation (record) packages were reviewed, and included items such as pull cards, termination cards, and inspection reports. Results of this review indicate that there is a possibly generic problem with records. Of the 27 packages reviewed, all 27 exhibited at least one, and usually more, of the following types of problems:

- a. Some termination cards (originals) have mis-identified the color code on IE applications as black, and QC is accepting them anyway.
- b. On some packages, a time lapse of up to 30 days occurred between work completion and QC inspection.
- c. Witness points on terminations were observed to be stamped-off by QC from 3 to 46 days after the termination was actually completed.
- d. Some termination cards are filed with no QC action.
- e. Only 4 of 27 packages reviewed displayed any reason for rework.
- f. EE-580 cards and related inspection reports fail to reference applicable DNs, NCRs, FCRs, or any reason or documentation for rework.
- g. EE-580 card revision numbers on final cable pulls are not referenced on the related inspection report.
- h. Final cable pull is documented on the inspection report on Item #1, Column 2. However, final raceway marking is not shown. This is typical on all partial and completed pulls.

Packages reviewed are:

| | | | | |
|------------|------------|-------------|------------|------------|
| CIDJAGCILA | AIDJ10C1SB | A1DJAAC1LB | B1DJ10C2SG | B1DJ10C2SQ |
| B1DJACC1LC | B1DJACC1LH | B1DJ10C25SC | B1DJ10C2SB | A1DJ10C1SG |
| A1DJAAC1LG | A1DJAAC1LJ | A1DJAAC1LD | A1DJ10C1ST | A1DJ10C1SQ |
| A1DJ10C1SR | A1DJ10C1SG | A1DJ10C1SE | B1DJACC1LL | B1DJACC1LJ |
| B1DJACC1LA | B1DJACC1LF | D1DJABC1LE | D1DJABC1LA | C1DJADC1LE |
| C1DJADC1LF | C1DJADC1LC | | | |

All of the above observations were included on SDR H-098 except item b. which was not indicative of a deficiency. A breakdown of further investigations related to each item is as follows:

- Item a - an apparent QC error in accepting inaccurate documentation.
- Item c - an apparent misrepresentation of intentions. While it is impossible to witness an activity being accomplished as much as a month and a half after its accomplishment, the stated intentions are that the attributes be inspected, not witnessed in process. If this is in fact the case, the terminology should be changed accordingly so that QC does not sign off a witness point which was not actually witnessed.

- Item d - cause indeterminate, but cards forwarded to records as being representative of a completed and QC accepted installation which do not have QC signoff, are judged to be deficient.
- Item e - related to item f. below.
- Item f - Although there is no specific procedural requirement to state the reason for rework (refer to Item e.), it is a requirement that QC enter applicable documents on inspection reports which, if accomplished, would automatically provide traceability to the reason why rework was required.
- Item g - Procedural violation.
- Item h - Procedural violation.

EXHIBIT 32ELECTRICAL QCP - PROCEDURES/COMPLIANCE

A review of procedures #QCP-10.17, revision 2 and 10.18, revision 2 was performed to assess the procedures' adequacy and "workability" with regard to ensuring that all important (in the PCVTs opinion) design and installation attributes receive QC scrutiny.

A general comment regarding the "workability" of both procedures is that the procedures make reference to, and depend upon, numerous other documents which need to be researched before an inspection can be made. As an example, QCP-10.18, 5.1.4 states that "Cable termination acceptance criteria is not limited to that described by this procedure."

As with Pipe Support QCP and inspection planning (Ref. "I.C. PIPE SUPPORTS/HANGERS" Summary, "Inspection Planning", the PCVT does not feel that the practice of making a QC inspector responsible for his/her own inspection planning, which consists of sorting through numerous documents to extract acceptance criteria, is prudent, nor that it meets the intent of the STP Inspection Program as described in Section 10, revision 2 of the STP PQAP.

One other comment regarding QCP-10.17 deals in part with observed practice on STP. Paragraph 5.2.2.1.3 indicates that raceway must be "...free of debris, obstructions, sharp edges". It would seem that the raceway would have to have been inspected in order to verify the above attributes. However, actual practice indicates that raceways do not receive inspection prior to cable pulling, which tends to minimize the capability to effectively verify the condition of the raceways.

There were two instances observed where compliance with QCP requirements was either not verifiable, or was apparently lacking. QCP-10.17, revision 2, 5.4.3 requires that cable inspection reports for completed installations contain (in Section 1 at the bottom) all reference drawings, DCNs, SCNs, FCRs, etc. During review of rework inspection reports related to the DJ System, it was observed that the majority did not reference any DCNs, SCNs, FCRs, NCRs, or any reason for the rework. This item is included on SDR #H-098. Additionally, QCP-10.18, revision 2, 5.1.3.1 requires the performance of daily surveillance inspections when terminations are being performed. In attempting to verify compliance with this requirement, copies of surveillance reports were requested from STP-RMS. None were produced. The two possibilities which exist are, 1) the surveillances are not being accomplished as required, or 2) the reports are not being forwarded to STP-RMS.

Response to the latter comment and unverifiable accomplishment of daily surveillance inspections was requested by June 28. Neither requested response was received, and the PCVT considers each to remain an open item.

EXHIBIT 33PK SYSTEM RECORDS

A total of fifteen (15) documentation (records) packages were reviewed including termination cards and pull cards. Results of this review indicate several discrepancies, most of which are generic in nature. These discrepancies are as follow:

- a. Line throughs on termination cards for corrections were not initialed and dated.
- b. Witness points on termination cards were not signed from nine (9) to forty-six (46) days after sign-off of completion of the affected work.
- c. Serial numbers and footage information were not being filled in on the front of pull cards. However, a note to "see other side" is handwritten near these blanks, and the footage markers are entered on the back side of the pull cards in pencil.
- d. Pull cards were missing from cable packages B1PK04C5SF and A1PK04C4SE.

Packages reviewed are:

| | | | |
|------------|------------|------------|------------|
| A1PK04C4SD | B1PK04C5SF | B1PK04C5SH | B1PK01C2WB |
| B1PK04C5SG | B1PK04C5SK | B1PK04C5SC | B1PK04C5SJ |
| A1PK03C1WB | B1PK04C5SE | A1PK02C1WB | A1PK04C4SE |
| A1PK04C4SF | B1PK04C5SB | B1PK04C5SD | |

EXHIBIT 34CABLE TRAY HANGER/SUPPORT OBSERVATIONS

The following is a listing of hangers/supports with their corresponding observations of deficiency detailed.

- Hanger #1-003-H-40 - The applicable connection detail indicates required bolting and welding. Although welding is acceptable, there is no evidence to indicate that QC acceptance occurred as required. Also, looking west at the top tray unistrut support and to the left lower attachment clip #G-3073-SP, the clip and all four bolts are rather badly damaged due to blows by an unknown object (most likely, a large hammer). Although this damage was probably incurred during installation, it cannot be concluded that it definitely existed at the time of QC acceptance (torque seal is applied to one of the bolt heads).
- Hanger #1-003-H-59 - This hanger has been QC accepted, although only one of three welds were inspected.
- Hanger #1-004-H-81 - Missing clip (G3073SP) from the top left unistrut looking west (2nd from top strut).
- Hanger #H-19 (drawing #3E209E56005) - Has intermittent welding beginning 4 1/2" from the bottom of the strut. As required by AWS A2-68, paragraph 406, figure 27, welds must begin at the end of the piece.
- Hanger #H-20 (same drawing as H-19) - Same condition as H-19. Welds start 6" from the bottom of the strut.
- Hanger #H-7 (drawing #9E56009) - Has a shop weld with overlap and oversize. Also, it was galvanized over weld spatter, which makes completion of sandblasting prior to galvanizing questionable.
- Hangers #H-45 and H-46 (drawings #9E56002 and 9E56003) - Galvanizing over weld spatter.
- Hanger #H-47 (same drawing as H-45 and H-46) - Rusting between unistrut and tubesteel indicates inadequate cleaning before galvanizing.
- Hanger #H-44 (same drawing as H-45 and H-46) - Galvanizing over weld spatter; field touchup over dirt and weld splatter.
- Hanger #H-40 (same drawing as H-45 and H-46) - Galvanizing over weld splatter and slag.

A general observation made was that many hangers' welds remain uncoated and are rusting. This will create the need for an abundance of cleanup prior to coating, which could have been avoided had the welds been coated soon after completion of the installation.

EXHIBIT 35CABLE TRAY, RACEWAY

The following is a list of areas in the plant where examinations were made, plus the drawing utilized during this review. Separately listed are adverse observations made during the review.

- EAB elevation 21' - drawing #9E2825 - (5) separate tray runs containing from two to four sets of trays each - total length approximately 40'
- EAB elevation 10' - drawing #9E2816 - (6) separate tray runs containing from two to four sets of trays each - total length of approximately 25'
- EAB elevation 10' - drawing #9E2817 - one tray run containing two sets of trays - total length of approximately 50'
- EAB elevation 21' - drawing #9E2826 - four tray runs containing four sets of trays each - total length of approximately 180'
- EAB elevation 10' - drawing #9E2819 - two tray runs containing two sets of trays each - total length of approximately 50'

Observations:

- Twelve (12) cables suspended from tray #A1XE2BTSAG are not supported. Also, Cannon plugs are not protected.
- Separation violation - conduit #N1EX2BRS001 is located within 1/2" of conduit #N1EX2BRS002 (minimum allowable is 1")
- Tray #A1XE2C7XAV and splice plate are damaged
- On tray #A1XE2C7XAV, the holddown spring nut is misaligned
- *Trays #A1XE2C7SAA, TAA, XAA and YAA are not identified on the west side of wall penetration (required by QCP-10.16, paragraph 5.2.1.3.8.D)
- Separation violation - the cable tray at support #1-002-H-28 has two permanent lighting conduits from within 1/8" to 1/2" of the tray bottom

- * - It was determined that missing tray identification is generic to "H" wall on all elevations for all trays observed which penetrate the wall.

EXHIBIT 36

DOCUMENT CONTROL

The PCVT accomplished a physical review of hanger #1-009-H7, plus applicable documentation. The documentation reviewed for this hanger included rework documentation. It should be noted that a considerable amount of difficulty was exhibited in locating the documentation requested.

The following is a summary of observations made related to this hanger and its documentation which appear to represent a document control problem.

- An inspection report (IR #02342) dated October 12, 1983 (as inspection complete) does not reflect the condition now in the field, nor the latest drawing change (reference drawing #3E359E58224, sh. 01, revision 5, dated February 8, 1985).
- The existing field condition is not reflected on the traveler dated January 23, 1984. This traveler was completed and sent to QC for inspection.
- A change was made to the traveler on April 19, 1985, but the traveler still does not reflect the final installation as inspected. (The current installation is accurate as per the currently applicable drawing dated February 8, 1985.)
- The existing configuration remains to be reinspected - four months after the design change.
- The original traveler does not reflect the applicability of FCR #BE-00488 dated December 7, 1984.

EXHIBIT 37CABLE TRAY, RACEWAY HANGERS/SUPPORTS - RECORDS

The PCVT reviewed a total of thirty-six (36) records packages which represented support/hanger installations. Of these 36, eighteen (18) were found to be unacceptable due to one or more problems, indicating a 50% reject rate. Details are as follow.

Packages reviewed with no discrepancies being noted:

| | | | |
|----------------------|------------|------------|-------------|
| Hangers # 1-001-H-16 | 1-002-H-43 | 1-002-H-42 | 1-002-H-40 |
| 1-002-H-5 | 1-003-H-50 | 1-004-H-62 | 1-004-H-102 |
| 1-004-H-126 | 1-006-H-9 | 1-006-H-15 | 1-006-H-23 |
| 1-006-H-40 | 1-007-H-92 | 1-007-H-93 | 1-007-H-94 |
| 1-007-H-95 | 1-007-H-96 | | |

Packages reviewed with discrepancies noted:

- Hanger #1-002-H-44 - This hanger, according to all documentation reviewed, is a type 025 hanger. However, the actual installation is a type 825 (acceptable per General Notes and details of 3E359E58000, sht. 03J, revision 1). The documentation does not reflect the actual type, and it does not mention substituted vertical members from 5812A to 7612A. Also, Inspection Report (IR) #00638 is missing from the package. Without this IR, there is no record of weld #5 having been QC-accepted.
- Hangers #1-005-H-19, 1-005-H-20 and 1-005-H-31 - These hangers' record packages were observed as having incorrectly made corrections (superimposed rather than line out, initials and date as required).
- Hangers #1-005-H-31 and 1-005-H-13 - These packages are missing applicable IRs.
- Hanger #1-013-H-67 - This traveler had an incorrect date for the torque wrench calibration due date. (Date entered was 4-19-50.)
- Hanger #1-003-H-40 - The IR (#00463) included in this package was indicated as being applicable to Unit 2.
- Hanger #1-003-H-59 - The IR (#01712) included in this package was indicated as being applicable to Unit 2.
- Hanger #1-004-H-81 - Welding inspection for this installation was documented on IR #02630, rather than form #CS-AD788 as required.
- Hanger #1-004-H-13 - This package referenced NCR #CC-1570 for welding procedure WP-11, revision 15. Review of this NCR, however, indicates that it is bolting-related, not welding.
- Hanger #1-006-H-24 - This hanger's record package could not be located as of June 24, 1985 (originally requested June 13, 1985).

- Hanger #1-003-H-41 - IR #00217 shows a fit-up-only acceptance of detail 3 (in 2 places) welding for support #1-003-H-57, not H-41. IRs #00261 and 00388 in this package are indicated as being applicable to Unit 2. Fit-up inspection on page 3 of IR #01052 should be a final inspection. The weld map in this package is incomplete (shows no evidence of welds being inspected).
- Hanger #1-003-H-42 - The traveler for detail 3 indicates fit-up only. However, IR #01052 indicates that this is a final inspection. No Weld Procedure Specification (WPS) is recorded. The weld map is incomplete (no evidence of welds being inspected).
- Hanger #1-003-H-43 - IR #ER00261 in this package is indicated as being applicable to Unit 2. IR #1052 is marked as a final inspection and used as such when, in fact, sheet 3 of the traveler indicates it to be a fit-up only. No WPS is referenced. IR #0581 is shown on the traveler as a final inspection when it is, in fact, only a fit-up, and has been accepted as such. There is no weld map included/no evidence of weld inspection.
- Hanger #1-003-H-57 - Four inspection reports filed in this package are indicated as being applicable to Unit 2. IR #1051 is used as the acceptance document for detail 3. No WPS is referenced.
- Hanger #1-003-H-61 - Three IRs in this package are indicated as being applicable to Unit 2. IR #1051 is used as an acceptance document for detail 3. No WPS is referenced.
- Hanger #1-003-H-63 - Five IRs in this package are indicated as being applicable to Unit 2. IR #1051 is used as an acceptance document for detail 3. No WPS is referenced.

EXHIBIT 38CABLE TRAY, RACEWAY INSPECTION - PROCEDURE REVIEW

I. QCP-10.30, revision 1

| <u>Comment #</u> | <u>Paragraph</u> | <u>Comment</u> |
|------------------|-------------------|---|
| A. | 5.2.5 Table II | While the procedure only provides minimum torque values, the applicable General Notes of 3E359E58000 require minimum and maximum values for Globestrut bolts. |
| B. | 5.2.3 | Although the "Electrical Raceway Hanger Inspection Record Traveler" provides verification of attributes for damaged galvanization/coatings, neither the acceptance criteria, nor reference to the applicable specification (AS1001) for coating of exposed areas, are provided in the QCP. |
| C. | Attachment B | The specification-required minimum fillet weld sizes based on material thickness (reference General Note #44 of 3E359E58000) are not addressed in the QCP, nor on the applicable weld inspection report. |
| D. | Attachment A | Block 16 includes drawing series 3E359E58000, notes 7, 36, 42, 55 and 68, but the Attachment C instructions do not explain how to complete this portion of the record/traveler. Other General Notes in drawing 9E58000 seem to be appropriate, but are not included (reference comment C. above). |

Nothing within this block, nor within the procedure, provides for acceptance/rejection of any work or actions taken to comply with the requirements of the applicable General Notes.

III. Civil/Structural

A. Category I Backfill

The PCVT performed a review of earthwork activities, the scope of which included:

- Receiving, testing, storage and placement of Category (Cat) 1 Backfill
- Test Laboratory equipment/operations and source qualifications
- Procedures, records and documentation package review

Documents utilized during this review included, but were not limited to, the following:

Specifications (including all applicable procedures)
5Y069YS0043, revision 11
2Y060YS0044, revision 5

Procedures (including all applicable procedures)
WPP/QCI-4.0, revision 10
QCP-10.10, revision 3
Other ECI, ESI and PTL Procedures as appropriate

Drawings, sketches and other documents as appropriate

Reviews accomplished during this verification resulted in the identification of a number of areas of concern, but no specific observations of any deficiency. Details are as follow.

As per specification 5Y069YS0043, revision 11, paragraph 4.1.2.3, backfill source material is required to be qualified by gradation test per ASTM D422 (and other tests), and these tests are to be performed for each 500 cubic yards of material received. Apparently to assist in quantifying the amount of material received, WPP/QCI-4.0 states that backfill material is to be off-loaded in piles not to exceed 500 cubic yards.

Actual practice observed during overview of receiving activities indicated that the 500 cubic yard requirement has been translated to "no more than 30 truckloads". Discussion with an assigned individual (laborer) indicates that if more than 30 truckloads are received, a new stockpile is started.

While this practice is more than likely suitable, it is recommended that the "30 truckloads is equal to or less than 500 cubic yards" formula be substantiated, and that, after substantiation, the "30 truckloads" attribute be included in the procedure to provide consistent direction.

With regard to the actual gradation of the materials, a log was observed which documents performance of tests. Documentary evidence of cubic yards received (e.g. - truck tickets) was not available.

PCRT response to this recommendation (ST-HL-HL-34169 dated June 11, 1985, and ST-HL-HL-34213 dated June 18, 1985) indicates that WPP/WCI-4.0 will be revised to reflect actual practices and required methodologies. The PCVT concurs with the response.

One observation/potential problem was identified with regard to the checking/calibration of sieve screens. It was determined that these are not being checked or calibrated as discussed in Appendices X1 and X2 to ASTM E-11. PCRT response to this item was that sieve screens are manufactured per ASTM-E11 requirements, that their attached nameplates certify to ASTM requirements and that normal usage verified absence of damage (in the case of damage, the whole screen is replaced instead of calibration).

The PCVT does not feel that this response adequately addresses the problem. ASTM-E11, section 1.1, states in part that, "Methods of checking and calibrating sieves are . . . in the Appendix." This refers to Appendices X1 and X2. There are no procedural requirements on STP to accomplish the checks/calibration, and information provided to the PCVT during the review indicated that checks are not being accomplished.

Another attribute applied to the backfill material by specification 5Y069YS0043, revision 11, paragraph 6.2.4 is that the material be free of organic material (ASTM D2488). PCVT observations related to verification of this attribute indicate a practice which warrants concern. Apparently, laborer personnel check each truckload of material for organic material. At the end of each day, all truck tickets are forwarded to Warehouse personnel who complete the MRR including all signatures and send it on to QC for "receipt". As a result of this practice, material is checked by laborers, but signed off as being acceptable by individuals who did not see any of the material. No deficiency is cited by the PCVT due to the fact that the material does later get checked by QC, but the practice observed seems to be questionable. It was observed that the basis for acceptance of material cleanliness is by sieve results (as per inspection reports).

One last observation was with regard to the means by which the site testing lab (PTL) is notified of material to be tested. According to PCVT observations, there are none (from a procedural standpoint).

The previously discussed response regarding quantification of backfill receipts adequately covered procedural changes for notification of the testing lab, and the PCVT considers that issue to be closed. PCRT response regarding the acceptance of backfill materials was as follows:

"The visual examination of the backfill performed by the laborer is commercial receiving check for gross contamination with foreign or organic material. In the future, this examination will be reported by signed form to the Material Storage Supervisor. At this time, the backfill material is Class 9.

The upgrading of backfill material from Class 9 to Cat 1 is based on the results of the testing performed by PTL. The organic matter contamination criteria in the specification is per ASTM D-2488. D-2488 is a lab test method for organic contamination. The PTL test reports specifically report organic matter per ASTM D-2488. The specification further requires inspection for cleanliness (organic matter contamination) prior to use. This is a post receipt function performed by Ebasco QC."

The PCVT considers this response to be satisfactory.

Cat 1 backfill placement activities were witnessed in progress (north of DGB #2) with no problems or concerns being identified. Review of the backfill stockpile near the area of placement indicated that the material was free of organic material. Placement and compaction of the material appeared to be satisfactorily accomplished. Due to the volume of placement observed, field density tests were not performed.

A review of Cat 1 backfill records was accomplished for areas on and around the Unit 1 30" ECW pipeline. Although no items of deficiency were observed, there were two areas of concern identified.

The first dealt with notations observed on the records (by attachment of yellow stick-on labels). These labels contained technical comments, and it was apparent that review of these records was as yet incomplete although they were approximately two years old. This was discussed with the Response Team and resolved. The Response Team has indicated that caution would be used during the actual CAT inspection to ensure that the status of a document is known and clearly explained to an NRC reviewer in the event that incompletely processed records are requested. It should be noted, however, that a technically inadequate record will still be cited as such, regardless of whether or not it has been through the entire review cycle.

Another topic of concern dealt with the mapping of Cat 1 fill material. The records reviewed did not contain any maps to indicate the coordinates and elevations of backfill areas and tests taken, which created difficulty in verifying that test locations were adequately distributed (laterally and vertically) within the fill area.

According to information supplied to the PCVT (verbal), the backfill around the Unit 1 30" ECW pipeline has been reworked three or four times. However, the records have not been separated to indicate which reflect the backfill presently in place from those which reflect areas that have been removed. Thus, the records reviewed may or may not be indicative of the earthwork presently in place.

As considered by the PCVT, the practice of mapping backfill is an important step in the process, and would contain the coordinates and elevations of the backfill area and test locations. It would include a plan view and preferably, a profile as well, and would become part of the QA records for that specific area. Discussions with the Response Team (BEC) on this subject indicate that it is not the intention or requirement to map backfill -- that alternate methods would be employed.

Review of procedures resulted in the generation of comments as detailed on Exhibit 39. It should be noted that the comments are reflective of some of the actual practices observed during the verification, and also relate to ECW backfill.

PCRT response to the ECW backfill, procedural and general backfill mapping issues were as follow:

"The concern raised by the PCVT is that backfill records do not include a composite drawing identifying relative location of each backfill placement and associated density tests. Since some areas may be reexcavated for new work, it is perceived that without a composite drawing to reflect the most recent work, the records may be in some way incomplete. The PCVT has questioned if there is a need to supersede voided backfill records as a result of reexcavating and backfilling in existing QC accepted areas.

The method of controlling backfill documentation on STP is a system that breaks down the plant site into a grid of smaller areas, each uniquely numbered. For each of these approximately thirty (30) grid areas, QC separately identifies a work area package. A typical grid area could have between ten (10) to forty (40) work area packages. Each work area package will contain all the applicable inspection reports sequentially numbered for that area. Each work area package also contains a grid system map showing the relative location of that package with respect to the overall grid system. In addition, each inspection report for the package has identified coordinates and elevations or a sketch showing the boundaries of placement. Although a composite drawing of all these areas has not been made, the current system provides adequate traceability and retrievability of records.

In regards to the question of superseding voided records, it is noted that reexcavation and backfilling boundaries will not correlate with the original boundaries of the backfill operations, hence, any backfitting program would not require marking up and modifying existing records. This is deemed to be a cumbersome, time consuming and costly operation with no real benefits to be gained. As noted above, records are kept by date and by areas sufficiently small (and with adequate information on the inspection reports) to allow the development of a composite drawing should any further question or problem warrant the expenditure of time and effort.

In conclusion, it is noted that there is no commitment or specification requirement to provide composite drawings showing backfill placements or test locations. The program in effect at STP is typical of industry practice and provides for adequate retrievability of records. Providing composite drawings and creating a program of superseding voided documents will provide no significant improvement on the quality of backfill records and is considered cost ineffective."

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(Procedurally related):

"Individual specification requirements for excavation and backfilling in the thirty (30) inch diameter ECW pipe trench were purposely omitted from QCP-10.10, revision 3, and replaced by a reference to design documents in each inspection attribute grouping.

The reason behind the omission was to exclude the numerous unique requirements for excavation and backfill of the subgrade, bedding, and material placed within the height of the 30 inch ECW pipe since this operation is completed. Should a major rework effort in these areas become necessary, the requirements would be reinstated.

The only current work in the ECW area is well above the 30 inch pipe. Requirements as stated in QCP-10.10 adequately address criteria applicable to this operation, with the exception of density test results. PCR #5 will revise paragraph 5.2.8.1 of QCP-10.10 to address ECW trench area material placed above the pipe."

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The PCVT recommends that the response concerning mapping and ECW backfill records be revisited to confirm its applicability/accuracy as it related to ECW backfill, and that the procedure related response be readressed as per the original PCVT recommendation (reference Exhibit 39).

B. Concrete

The PCVT performed a detailed review of the activities and documentation related to concrete. The scope of this review included verifications in the following areas:

- Placing and splicing of reinforcing steel
- Preplacement inspection
- Concrete production and control of constituents
- Concrete testing laboratory equipment and operations
- Concrete placement, inspection and field testing
- Concrete postplacement activities
- Concrete records and related procedures

Documents utilized during this review included, but were not limited to, the following:

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Specifications (including all applicable changes)
2A010CS0001, revision 7
2A010CS0002, revision 3
2A010CS1003, revision 2
2A010CS1004, revision 2
2A010CS1004, revision 4
2A010CS0027, revision 7

Procedures (including all applicable changes)

QCP-10.1, revision 4
 QCP-10.2, revision 4
 QCP-10.3, revision 4
 QCP-10.4, revision 4
 QCP-10.6, revision 3
 QCP-10.23, revision 3
 QCP-10.24, revision 5
 QCP-10.25, revision 3
 CS-0014, revision 0 (Champion procedure)
 Other Champion procedures as applicable
 WPP/QCI-4.0, revision 10

Codes and Standards

ACI-309-1972
 ASME-ACI-359 (Section III, Division 2, and Addendums 1 - 6)

PCVT verifications in the concrete area were performed by observing and/or reviewing work/inspection activities, completed work, and records directly against design requirements and commitments, and against approved procedural instructions. The following is an overview of PCVT activities and verification results.

A verification of reinforcing steel (rebar) and cadwelds was performed. Rebar placement and cadwelds (through to representative records) were reviewed for placement number 2-DG-S-082-001. Additionally, a physical review of cadwelds for the Unit 2 CTMT Dome Springline was accomplished, and related records for ten (10) of these cadwelds were reviewed. There were no problems or areas of concern identified with actual rebar placement, cadwelds, or completeness/technical adequacy of records reviewed.

Prior to placement of concrete (placement #2-DG-S-082-001), a verification was made by the PCVT using applicable preplacement inspection attributes, and there were no problems or areas of concern noted.

The equipment and operations of the concrete supplier (Champion) were observed during the production of safety related concrete. Items and activities verified included main plant equipment, calibration records, aggregate storage piles, uniformity tests, and actual concrete production. A total of twenty-five (25) batch tickets were reviewed resulting in a determination that the appropriate information was being provided, including the amount of water in the mix (necessary to provide information at the placement site to ensure that any additional water entered into the mix will not exceed the maximum water/cement ratio). There were no problems or areas of concern identified during review of equipment and actual work activities. However, a general concern was raised with regard to this contractor's procedural program. Refer to the appropriate section of Exhibit 42 for details regarding this concern.

Actual concrete placement activities were witnessed during placement #2-DG-S-082-001. Activities observed included conveying and discharge of concrete, disposition and consolidation, hot weather practices, and QC inspection activities. Although there were no problems identified during the actual placement, one problem was observed regarding equipment.

As required by ACI-309, verification of acceptable frequency of concrete internal vibrators is to be accomplished immediately prior to the start of consolidation activities. It was observed in one instance that this verification did not occur. Subsequent to making this observation, the PCVT interviewed the QC inspector. The interviewer noticed that the inspector had a Vibra-tac in his shirt pocket. When asked when it was intended that the verification be made, the inspector stated that the vibrators' frequencies are checked when suspicions arise regarding the equipment (when it doesn't "sound right"). It should be noted that the use of a Vibra-tac is a simple and quick procedure, and frequency verifications are required by the Code.

The PCVT has determined that the most probable cause of this failure to check frequency as required is not attributable to personnel, but rather to procedural controls. As per QCP-10.2 (detailed comments are on Exhibit 42), the operating cycle of vibrators is to be checked prior to initial use, and thereafter as "... deemed necessary.". Therefore the statement by the QC inspector that vibrators are checked when they don't "sound right" is fully reflective of applicable procedural direction. The procedure, however, is not reflective of Code requirements.

PCRT response to this issue was as follows:

"Specification 2A010CS1009, section 5.9.1, "Consolidation of Concrete", refers to ACI-309. Applicable sections of ACI-309 to "Consolidation" such as chapters 4 and 5 do not specify any requirements for checking of vibrators. Therefore, checking of vibrators is not applicable.

QCP-10.2, section 5.2.7.3, specifies requirements for checking of vibrators which meets the intent of ACI-309, section 15.3. The QCP requirements are followed; therefore, there is no procedural problem.

The concrete strength tests show very good and acceptable results. This provides an indication of good consolidation. Hence, it is our position that the present system of work is perfectly acceptable."

The PCVT considers the response to be unacceptable for the reasons that follow:

- Specification 2A010CS1009, revision 4, 5.9.1, states that, "Concrete shall be consolidated by mechanical vibrators in accordance with ACI-309." Checking of vibrators as described in section 15.3 of ACI-309 is applicable.
- As previously discussed, the procedural requirements after initial receipt checks are virtually nonexistent, do not meet the intent of ACI-309, 15.3 (the intent of which is specific), and are inadequate.

- Concrete strength tests are made in accordance with ASTM C31 (which does not address checking of vibrators). Concrete strength is determined by the water/cement ratio, and is not relevant to field consolidation with vibrators (unless test cylinders are consolidated with vibrators in lieu of the standard rod).

Activities of the testing agency (PTL) were observed at the placement site. Activities reviewed included sampling compliance with required frequency, test equipment used, performance of actual tests, handling of nonconforming conditions (QC initiated NCR #HC-02816.), and the performance of correlation testing. There were no problems or areas of concern identified.

Concrete placement activities (related to the previously witnessed pour) were reviewed. This review included an actual review of the concrete, inspection activities, and cubes to verify minimum supporting strength and curing. No problems or areas of concern were identified.

A review of five (5) ESI concrete records packages and three (3) packages by the previous constructor were reviewed for completeness and technical adequacy. A number of concerns were identified. These concerns deal for the most part with the filing methods employed for the previous contractor's records, and the timeliness of retrievability. (Note that all requested records were eventually produced.) Detailed observations are as found on Exhibit 40.

A total of nine (9) non-shrink grout placements were reviewed. It was observed that, while the grout placed appears to be in compliance with existing specification requirements, the specification does not necessarily coincide with the manufacturer's recommendations in all aspects. Details are found on Exhibit 41. Grout placements reviewed were:

| | |
|-------|-------|
| 1P5-1 | 1P6-1 |
| 1P5-2 | 1P3-1 |
| 1P5-3 | 1P3-3 |
| 1P5-5 | 1P3-5 |
| 1P5-6 | |

Relative to concrete inspection activities, a total of nine (9) procedures were reviewed for adequacy and "workability". These procedures are listed at the beginning of the summary. (WPP/QCI-4.0 was not reviewed.) As already discussed, the PCVT feels that the comment to QCP-10.2 related to verification of vibrator frequency is a direct indication of cause with regard to observed failures to implement Code requirements during concrete consolidation activities. Regarding all other procedural comments, the PCVT recommends that they be considered and incorporated as appropriate, and that a result will be more concise and "workable" direction to the personnel tasked with procedural implementation. Detailed comments are as found on Exhibit 42.

An apparent inaccuracy in the FSAR was observed, and is as follows:

FSAR item 3.8.1.6.3 states in part that, "The requirements of section CC-5320 of the ASME-ACI 359 document are compiled with in regards to crew qualification, NDT, tensile testing, tensile test frequency, and the procedure for substandard tensile test results."

Review of this ASME section by the PCVT indicates that it addresses those attributes to be examined when performing a visual examination of a cadweld; it does not address tensile testing and frequency, crew qualification, or the procedure for substandard tensile test results. These attributes are addressed in ASME-ACI 359, CC-4333.

The PCVT recommends that appropriate FSAR corrections be initiated.

C. Expansion Anchors

The PCVT performed a review of hardware and software related to anchor bolts on STP. This review included an examination of existing specification and procedural requirements, in-process review of drilling for, installation, and torquing of anchor bolts, review of selected verification records, and a review of the history of Hilti-Kwik bolts on STP.

Documents utilized during this review included, but were not limited to, the following:

Specifications (including all applicable changes)
5A01OSS1000, revision 6
4A01OSS1007, revision 1

Procedures (including all applicable changes)
QCP-10.19, revision 6
QCP-10.24, revision 5
QCP-10.33, revision 0

The following is an overview of PCVT observations and conclusions reached during the review of this commodity.

A review was performed to follow up on the disposition and resolution of a nonconformance report (NCR) which had been issued by the previous constructor (B&R), which documented B&R installation of Hilti-Kwik bolts in violation of existing Technical Reference Document (TRD) requirements. This NCR was "rolled over" to an ESI NCR at the time of transition to the current contractor, and was dispositioned by BEC. This review included an evaluation and comparison of previous design, installation, and inspection requirements, plus supporting qualification test data to those design, inspection, and test requirements currently in place on STP. As a result of this review, the PCVT has identified an area of concern. Evaluation and comparison of the B&R-initiated anchor bolt (Hilti) TRD design requirements and supporting independent agency test results, to those specification and

procedural requirements currently applicable to this commodity indicate that anchor bolt installation and acceptance requirements are now less stringent than those existing in the TRD as a result of the previously performed qualification test. Details regarding this review are as found on Exhibit 43.

Two (2) in-plant verifications were performed on Hilti bolt installations (Note that maxi bolts and rock bolts were not reviewed.) in the Unit 1 MEAB and DGB. Details regarding these verifications are as follow.

A total of twelve (12) drilled-in anchors (Hilti bolts) were reviewed in the Unit 1 MEAB, elevation 60' at column lines "J" and 24, and fourteen (14) others were verified at elevation 10' (3' south of 28 and at "G"). Attributes verified during this evaluation included proper identification and projection of the bolts above the slab, with no problems or concerns being noted.

None of these bolts had been torqued or had nuts installed at the time of the review. In this regard, an area of concern was identified. With regard to material control, the PCVT escorts were questioned as to the location of the nuts which would be used on the bolts that were installed. This information could not be provided, and resulted in a subsequent concern with regard to the location of the nuts, as well as assurance that controls exist to ensure that the correct nuts would be utilized. Response received from the Response Team (BEC Engineering) indicated that procedure QCP-10.7, which is referenced in QCP-10.19, provides for the identification of nuts and other material. QCP-10.7, in turn, references the construction procedure ASP-5 for material control. The PCVT review of this information indicates that the QCP-10.19 references to QCP-10.7 identify only expansion anchor material control (reference paragraph 5.2.1.5(2)), and baseplates (reference paragraph 5.2.3.2). The identification requirements for nuts for concrete expansion anchors (Hilti) are addressed in the revised Attachment B, which was issued as part of PCR #5 to QCP-10.7, revision 5; however, cross reference from the QCP-10.19, revision 6, "Expansion Anchor Inspection Procedure", in the estimation of the PCVT, is not clear. It is anticipated that the incorporation of the PCRs issued against QCP-10.7 will provide additional clarity with regard to material control and traceability of items.

In addition to the twenty six (26) drilled-in Hilti bolts which were reviewed in the MEAB, a total of six (6) installations were reviewed in the DGB, Unit 1, at elevation 25' near column line "H" and between column lines 18.2 and 16.9. Attributes verified during this review included location, torquing, embedment, marking, spacing, thread engagement and procedural compliance. Review of these in-process activities indicated that no problems existed and that the procedural requirements were being adequately followed.

Based upon the limited review of thirty-two (32) Hilti bolt installations, the PCVT has determined that, to the extent verified, activities and hardware are in accordance with applicable requirements.

The PCVT made one observation where spacing requirements were not being met during an expansion anchor relocation activity. This observation will not be specifically reported, due to the fact that this activity was subsequently found to be a non-safety related installation. However, although not applicable to non-safety related activities, comment #F on Exhibit 44 addresses a lack of proceduralization of specification restrictions with regard to the redrilling and relocation of expansion anchors. Based upon the observed non-safety related installation and the lack of procedural direction with regard to specification-imposed restrictions on this activity, PCVT feels that similar situations could possibly exist in the redrilling and relocation of expansion anchors in safety related applications, and recommends that appropriate reviews be performed to determine if such problems do, in fact, exist.

The applicable inspection procedure (QCP-10.19) was reviewed against the requirements of the BEC installation specification (5A010SS1000), and a number of comments were initiated with regard to the procedures not containing all of the specification-imposed requirements/commitments. These comments are as found on Exhibit 44. Comment #D and comment #F were determined to be of particular concern. Although no response to these procedural comments was required, the PCVT recommended that appropriate reviews and considerations be made to determine the need for including a more detailed description of the requirements to be met, providing for enhanced procedural compliance and workability to the individuals tasked with performing the inspection function.

D. Structural Steel, Bolting

The PCVT performed a detailed review of hardware and software related to structural steel (SS) fabrication and installations. This consisted of a review of the Unit 1 Containment liner plate, SS AWS welding, SS bolted connections, material traceability, QA records and applicable inspection procedures.

Documents utilized during this review included, but were not limited to, the following:

- Specifications (including all applicable changes)
 - 2C269SS0006, revision 4
 - 3A010SS0030, revision 4

- Procedures (including all applicable changes)
 - QCP-9.5, revision 5 w/ PCRs #1 and 2
 - QCP-10.5, revision 4 w/ PCRs #1 through 5
 - QCP-10.7, revision 5 w/ PCRs #1 through 7

- Codes, Standards
 - AWS D1.1 - 1977
 - AISC - 1976

There were no problems observed during the review which the PCVT considered to be of a serious nature. However, there were a number of observations made which indicated the potential for a general lack of attention to detail and/or shortcomings in the system to ensure that all required work is accomplished satisfactorily. The following is an overview of results related to the PCVT SS verification.

Specification 2C269SS006, paragraph 2.5.5.2.4, requires that all temporary attachments to the liner plate be removed after completion of welding, and that the liner surface be restored to its original condition. During review of the Unit I Containment Liner plate, the PCVT observed that several temporary attachments (one nut and three plates) existed. These attachments are located at approximately elevation 80' near coordinates S47.133, E51.022. It should be noted that the liner has been installed and accepted since 1979. It is not apparent as to whether the contractor (PDM) which installed the liner plate failed to remove the attachments, or whether they were installed by others at a later date. In any event, they were not removed, nor were any personnel apparently aware of their existence until the condition was identified by the PCVT.

PCRT response to this matter was as follows:

"The temporary attachments reported by the Pre-CAT team may have been welded by PDM or Ebasco.

There are more temporary attachments welded to the liner plate. Some are covered by NCR CC-02832. A walkdown for the remaining attachments is being planned.

The temporary attachments will be removed unless otherwise determined by Engineering.

Future temporary attachments will be welded per QCP-9.1, ASME section IX and Specification 2C269SS0006."

While the PCVT views this response to be adequate, it recommends that appropriate actions be taken to ensure accomplishment of all required actions (e.g. - "closing all open loops").

During SS reviews, the PCVT observed numerous instances where reworked/repaired SS connections were not receiving coatings touchup, often as long as 1½ years after completion of the structural work. Review of applicable procedures and interviews with cognizant individuals did not result in the identification of any program or procedure to control this activity.

A general observation was made with regard to housekeeping, which was observed to be completely lacking on SS lower flanges. The PCVT observed dirt, concrete, bolts, nuts, soda cans, electrical filings, unistrut, "C" clamps, face shields and other items at different areas of the plant.

Review of AWS welding indicated that weld deposits invariably met minimum requirements (and often exceeded maximum). It should be noted that the subject of weld reinforcement in excess of specified requirements, while outwardly appearing to not be a problem with regard to structural integrity of the connection, nevertheless indicates a problem with regard to inspection. Any weld which does not fall within the established size range should be considered as being in violation of applicable design requirements and should be appropriately reported for engineering evaluation. A QC individual should not take it upon himself to deem an oversize weld as being "better than" and accept it.

One observation was made with regard to welding inspection reporting. As per specification requirements (SS0030), welds are to be checked for the following attributes: size, length, location, defects (cracks) in the weld or base material, presence of all required welds, and the absence of any unspecified welds. The inspection reports which are used, however, require only indication as to the weld's acceptability with no specific verification attributes to be recorded. It is recommended that more specificity be added to the inspection reporting form.

Two specific observations which were resented to the PCRT for response (in Interim Report #5) and the resultant responses are as follow.

In Unit I RCB, west of AZ 198° - 30' (at elevation -2'), two short beams which were bolted to the same supporting beam were observed as having different connection clips. One was slotted and the other was fixed. This had been previously presented to the Response Team, but clarification had not yet been provided. The clarification needed was with regard to which type of connection is correct, and what, if any, actions will be/have been taken to evaluate the adequacy of the connection "as is", or to effect appropriate rework.

Ultimate PCRT response was that, "These two beams are supported by the same beam. One . . . is attached by welding and the other . . . by bolting. Either . . . is acceptable."

The PCVT has concluded that this response is not applicable to the issue at hand. The connection at issue is bolted at both areas. One is a slotted clip angle with double nuts on the bolts, and the other is of a normal bolting configuration. It is recommended that this issue be revisited by the PCRT.

The second item deals with two HVAC ducts (approximately 12' - 4" east of column line at AZ 227° and 5' - 6" west of column line at AZ 58° in RCB I (elevation -2')), which were observed to be solidly welded to beams which are thermally moveable. The ducts are oriented transversely to the anticipated direction of beam movement. The original response from the PCVT escort (BEC Engineering) was that there should be no problem -- that the support angles would be able to

compensate for any torsion created by the beam movement. Subsequent followup by the Response Team (BEC Engineering) resulted in a statement that the thick (approximately 1/8") gasket material in the ductwork assembly would be able to prevent any problems when the beams move. Formal clarification was requested which would provide resolution regarding the adequacy of the connection and the ability for the support angles and/or the gasket to compensate for any anticipated movement at this fixed connection.

PCRT response was that, "The thermal movements in structural steel parts are expected to be small. The flexibility of steel hanger and gasket material will allow this thermal expansion without any structural problems. Therefore, the HVAC ducts installed are acceptable."

PCVT review of this response resulted in an identified implication that the HVAC ductwork (which is solidly welded to the beam) is thermally movable. Provided that supporting data can be produced to substantiate the response statements that the support gasket will compensate for any anticipated movements, the response could be considered to be adequate. The response appears to be based on an Engineering judgement, however, and the project is advised that these types of judgements are usually criticized by the NRC during a CAT inspection. It is recommended that the project continue this as an open item.

Several concerns were identified with regard to connections which have been reworked from bolted to welded connections. One is paint touchup, which has already been addressed. Two others exist, one of which deals with controls in place to track connections which have been changed in this manner after initial acceptance by QC. The project should ensure that such changes are statused on appropriate documentation and that acceptance records in the vault are appropriately superseded by documentation which reflects the current configuration.

The last concern, which is actually a procedural violation, deals with the identification and control of bolts which have been removed from these connections. As required by specification SS0030, paragraph 5.2.8, ECI is responsible for implementation of a procedure to control the reuse of bolts (by color coding or other means) in order to identify bolts already tightened twice and bolts that must be removed from the work area. This requirement is covered in QCI-10.5. Contrary to these requirements, numerous observations were made by the PCVT where uncontrolled bolts were lying about the plant without identification, color coding, or any apparent means of removal control. It should be noted that, as per specification paragraph 5.2.6, reuse of ASTM A490 bolts is not permissible. The concern of the PCVT is that failure to implement the required controls on reuse or removal of bolts from the work area makes it entirely possible to reuse bolts and impossible to detect the practice.

Verification of nonconformance control regarding SS bolted connections was accomplished. Twenty (20) out of three hundred sixty three (363) field bolt torque verification reports were reviewed related to NCR #GC-00152. Five (5) of the reports indicated that galvanized bolts had been replaced. Six (6) of the reports mentioned the presence of galvanized bolts, but did not make any reference as to their disposition. Nine (9) of the reports made no reference to galvanized bolts. (It is assumed that there were none.) It should be noted that specification SS0030, paragraph 5.2.1, prohibits the use of galvanized ASTM A490 or A325 bolts. By review of these reports, it appeared as if this requirement was, and remained, violated. A response to this item was required, and was to address both specific and generic implications/required actions. PCRT response was received and stated that, "Inspection reports for NCR GC-00152 were not for attributes. Only specific problems were referenced . . . Normal QC inspections were also done for each connection and . . . document the correct installation. Galvanized bolts are not in use in Category 1 structures."

Assuming this response's accuracy, the PCVT considers it to be adequate.

A total of one hundred thirty-three (133) bolted SS connections were reviewed by the PCVT, with seventy-three (73) of these being checked for torque adequacy. Specific details regarding observations made (negative only will be listed) are as found on Exhibit 45. Approximately seven percent (7%) of the 73 connections checked for torque adequacy were found to be loose, although it was observed that some had been torqued nearly to the minimum requirement. A comparison of the PCVT results to those accumulated during a BEC-initiated bolt torquing program (circa 1983) indicates that this program, while it did not eliminate it, apparently effected a significant reduction in the incidence of loose bolts.

Aside from loose bolts, a common observation by the PCVT related to missing bolts. The PCVT was not aware of any closed-loop system in place which would ensure that missing bolts ultimately get replaced and reinspected, and requested a response to this item.

A response regarding one (1) specific observation of missing bolts was received (in RCB 1 at AZ 198°-30', approximately 6 feet from liner plate) which was accepted by the PCVT, but no response of the nature requested (with regard to a closed-loop system) was received. The PCVT considers this to remain an open item.

Another observation which was presented to the Response Team for resolution is as follows. The PCVT observed that beams located at elevation 81' - 11" of the MEAB Unit I between columns 24 - 25 and H - J lines were installed using ASTM A307 cadmium plated bolts rather than the required ASTM A325 bolts. Feedback on this item indicated that, "ASTM A307 cadmium plated bolts have been used as fit up bolts. The connection was not ready for QC inspection acceptance. Proper ASTM A325 bolts will replace these fit up bolts when the connection is completed and readied for QC inspection." The PCVT concurs,

although the practice of using incorrect bolts for fit up is not desirable. It is recommended that the project follow up on this item to determine why the proper bolts were not available for fit up in the first place.

An observation unrelated to bolting was made in MEAB Unit I at elevation 81' - 11". A shelf angle weld, located where "25" line intersects "H" line, is cracked. This condition has been documented on a DN (not yet presented for QC acceptance).

It should be noted that NCR #CC-02855 has been generated to document the loose bolts observed during this review.

QA records for nearly all of the hardware reviewed were verified. With the following exception, no problems were identified. A torque testing and boltup inspection report (#00446B) was reviewed, with the following condition being observed.

The date of the inspection was indicated as being October 12, 1983. The calibration due date for the torque wrench utilized was indicated as being October 11, 1983. The immediate indication is that a torque wrench with an expired calibration was used. However, on November 3, 1983, the inspection date was changed to October 12, 1983, to coincide with the calibration due date. Feedback from the Response Team on this issue was that the individual had made an entry error, and that the date was changed to reflect the actual inspection date. The Response Team indicated that the ESI individual had generated an IOM to explain why the change had been made, but that ESI was not willing to supplement the QA record with this IOM substantiation. Considering the implications, the PCVT originally reported this observation as an as-yet unresolved issue, and requested that a response be provided to formally substantiate the change.

PCRT response to this issue was as follows:

"The inspection of torque was done on the same day when the calibration was due. The date on the inspection report was erroneously shown as the next day, which was corrected by initialing the inspection report. Such correction is procedurally acceptable."

Although the PCVT has no comment regarding this response, it is recommended that the IOM explanation be included as a supplement to the QA record so as to preclude further questions.

Review of QCPs related to SS fabrication and installation inspection resulted in a number of comments which are detailed in Exhibit 46. As with many of the other QCPs which have received review, the majority of comments deal with "workability" and clarity.

E. Post Tensioning

The PCVT accomplished a review of documents and activities related to the post-tensioning process. The scope of this review included a

review of applicable design documents, contractor (Prescon) procedures, installation activities, and QA records search (to be discussed).

Documents utilized during this review included, but were not limited to, the following:

Specifications (including all applicable changes)
2C239CS0003, revision 3
2C239CS1001, revision 3

Procedures (including all applicable changes)
F1M-STP-V-1, revision 2 (Prescon)
(no number), revision 4 - "Quality Control Procedures Manual"

PCVT investigations for this commodity were accomplished by the witnessing of actual installations of vertical tendons in Unit 1 and reviewing of Prescon development and fabrication records. Verification of trumplate assembly and sheathing installation was limited to the review of completed Unit 1 work. It should be noted that installation activities have just begun; therefore, completed records for tendon installations were not available for review. A total of two (2) problems and four (4) concerns were identified during this review. The following is a summary of the PCVT observations.

Problem:

As required by specification 2C239CS0003 and reflected in the Prescon procedure, a thin coat of tendon grease (2090P4 or equal) is to be applied to tendons as they are being installed/pulled into the void. Contrary to this, the PCVT observed that grease was not being applied.

Feedback from the Response Team indicates that an Engineering (BEC) evaluation of the requirements has resulted in a determination that the intent is not to require greasing of the entire tendon during pulling; rather, that grease be on hand and applied to tendons where it is observed that bare spots are present on the tendons. Subsequent to this evaluation, it has been stated that a Specification Change Notice (SCN) has been generated to clarify BEC intent, and that the Prescon procedure would be revised accordingly.

A response was requested by June 28 which was to indicate completion of these actions, but none was received. It is recommended that this be continued as an open item.

Problem:

Specification 2C239CS0003, revision 3, requires a verification of eccentricity to .01 inches for each buttonhead tested for splits and to the "Go/No-Go" Gauge (reference specification paragraph 4.8.4).

Review of the contractor (Prescon) procedure FQCP-STP-03 indicates that verification of buttonheads for splits and "Go/No-Go" is delineated (including frequency), but that a frequency for

eccentricity checks (as required by BEC specification) is not included. Witnessing of actual buttonheading activities of tendon wires by the PCVT on June 25, 1985, resulted in observations that, while each buttonhead was size checked (Go/No-Go), none were checked for eccentricity.

This is considered to be a violation of existing specification requirements.

Concerns:

The following observations were made during witnessing of tendon installation activities (tendon #V-131):

1. Loading of the tendon coil into the uncoiling tub was accomplished at an angle which caused the coil to rub against the concrete surface. This could cause grease removal and damage to the tendon wires.
2. The tendon was fed through a corrugated pipe which abraided some of the grease.
3. The observed angle of tendon insertion into the sheathing caused it to rub against the side of the trumplate hole which caused removal of grease from the tendon.
4. Lighting available and used for QC inspection of this operation was deemed to be inadequate. The PCVT recommends that inspectors be provided drop lights to perform these inspections.

The PCVT recommends that appropriate actions be taken to modify the tendon installations process, effecting corrections to the observed conditions as described in concern numbers 1 through 3.

An additional observation made by the PCVT, which was not followed up due to time constraints, but is nevertheless provided for project information and consideration, is as follows.

On May 14, 1985, a PCVT member made a tour of the tendon access galley to review general post-tensioning activities' status. During this tour (note that tendon installation activities had not yet begun), a total of twenty-four (24) open hold tags was observed in the galley area. According to PCVT contacts (BEC Engineering), these represented Prescon-initiated DDRs which were generated because many tendon sheathing installations did not meet the minimum 4-5/8" diameter obstruction check after concrete placement. In addition to the open hold tags, the PCVT noted an approximately equal number of closed hold tags which had been resolved (as per ECI Engineering) based on changes to the obstruction testing device.

During the actual PCVT verifications in this area on June 11, 1985, the PCVT observed that there were no open hold tags remaining in the area.

Although the PCVT had no reason to believe that these hold tags/DDR's were not adequately resolved, it was recommended that the project review this matter to ensure adequate resolution prior to commencement of tendon installation activities. It should be noted that, as per the PCVT contact (ECI Engineering), the DDR's are resolved between ECI and Prescon. There were no indications that BEC Engineering was involved in their resolution. (Note that, according to the STP QA Program, BEC Engineering is tasked with review and dispositioning of nonconforming conditions.)

Subsequent response to this item by the PCRT indicates that the documents in question were, in fact, SDDR's, not DDR's, and that all have been adequately resolved in accordance with existing project procedures. The PCVT considers this issue to be closed.

During PCVT activities in this area, an attempt was made to obtain and review records relative to design and development. These records include, but are not necessarily limited to, the following:

- Letter of conformance stating that caps were fabricated to remain leak-tight under pressure equal to 150% of the required pumping pressure.
- Documentation substantiating determinations with regard to yield strength, ultimate strength, percent of elongation, and number of failed wires (based on test results using a representative full size static test assembly 10' long).
- Documentation to substantiate acceptable inspections of all welds including fillet weld size.

The PCVT was advised that these Prescon records are not on site. It was stated (by BEC Engineering) that the verification test results are available for review in the Houston design office, and that the welding inspection records are still in the Prescon corporate offices in San Antonio, TX. The PCVT elected not to travel to either of these locations, so none of the records received review. It is recommended that these type contractor records be available for review on site at the time of the actual CAT inspection.

Although a detailed review of the Prescon procedure was not performed, usage of the procedure in conjunction with applicable STP design requirements and the PCVT checklist did not reveal any apparent shortcomings.

Based upon the observed problem and concerns, combined with the fact that actual post-tensioning activities are only in the initial stages of implementation, the PCVT feels that an excellent opportunity exists to effect any needed process modifications/enhancements to ensure that the post-tensioning activities on STP are completed in an effective, trouble free manner. It is recommended that this be accomplished, and that plans be developed and implemented to carry out an aggressive in-process surveillance effort of this contractor's activities to further ensure hardware and records' adequacy.

F. Coatings

The PCVT accomplished a review of documents and activities related to protective coatings. The scope of this review included an examination of applicable design documents, contractor (ESI) procedures, storage conditions, field preparation activities and QA records review.

Documents utilized during this review included, but were not limited to, the following:

Specifications (including all applicable changes)
4C080AS1007, revision 4
3C080AS1001, revision 10

Procedures (including all applicable changes)
QCP-10.8, revision 5
CSP-30, revision 4
WPP/QCI-4.0, revision 10

Miscellaneous
Request for Engineering Assistance (REA) #C-4-84-0081
Final Safety Analysis Report (FSAR) Table #3.12-1
Regulatory Guide #1.54-June 1973

PCVT investigations of this commodity included a review of applicable regulatory documents, design specifications and procedures; witnessing QC inspection performance during field preparation (sand blasting) activities; review of receiving; Unit 1, Unit 2 and paint shop storage areas; and review of miscellaneous, applicable records. No actual coating application activities were observed. Although no problems were observed, a total of five (5) concerns were identified during the review. The following is a summary of the PCVT observations.

One (1) concern was noted with respect to comments resulting from the review of the Protective Coatings Inspection procedure (QCP-10.8). Concern was noted regarding lack of instructions for performing adhesion tests required by specification AS1001 and because a nonexistent attachment is referenced in the procedure. Refer to the appropriate section of Exhibit 47 for details of this concern and other observations.

Three (3) concerns were noted as a result of reviewing records for three distinct coating areas, including Ebasco QC personnel certification, certification of coatings applicators and coating application records packages. The three following concerns raised are defined in detail on Exhibit 48.

- The records of ESI QC inspection personnel certifications submitted to the HL&P Records Management System (RMS) are not current. The certification dates had expired on two (2) of the three (3) personnel reviewed in RMS, although current records were subsequently found in the possession of Ebasco records personnel.

- Contrary to the requirements of ANSI N101.4, as addressed in Regulatory Guide 1.54, there is no Quality Control procedure addressing QC inspection involvement in certification of coating application personnel. Applicator certifications do exist, and were found to be in compliance with requirements of the applicable construction procedure (CSP-30).
- The present system for maintaining coating application records does not define a system for determining when a room or area is complete.

The four (4) paint storage areas on site were reviewed for compliance with temperature, coatings expiration dates, temperature recording device calibration and document control requirements. The only potential concern found was resolved during the inspection.

An additional general concern which was raised by virtually all members of the PCVT throughout the course of the investigation dealt with coatings touchup (lack thereof).

The PCVT observed that coatings (e.g. - paint, galvanizing) touchup had not been accomplished, usually in field weld zones, on an across-commodities basis. This includes pipe supports, electrical supports, HVAC supports, piping, structural steel, concrete, and others. In field weld zones, the PCVT observed that the lack of touchup had resulted in rusting, varying from slight to heavy dependent upon the amount of time which has elapsed since completion of installation. This will, in many cases, create the need for a large amount of pre-touchup surface preparation/additional expense which could have been avoided had there been controls in place to accomplish coatings touchup in a timely manner.

The main area of concern which still exists, however, is with regard to an observed lack of any controls on the project which would ensure that needed coatings touchups do get accomplished. None of the inspection procedures reviewed which apply to a specific commodity installation, contain requirements that coatings touchup be verified prior to acceptance of the installation. Additionally, applicable site coatings procedures do not contain touchup activities within their scope.

In summary, the PCVT has not observed the existence of any controls on the project which would serve to ensure that needed coatings touchup activities are tracked (accounted for), completed, or verified.

PCRT response to this issue was as follows:

"Notification of release for commodities to be coated generally is given in a verbal form by the craft superintendent, although in some cases written notification may be submitted . . . Tracking of completed items for HVAC and electrical supports is done by traveler packages which provide signoffs for coatings work performed. The procedure allows the electrical discipline to check N/A (not applicable) in the coating signoff section.

This allows submittal of documentation for review/acceptance and turnover of documents to RMS.

Those items that are not coated immediately are acceptable based upon the corrosion factor assigned to the STP area by NACE. Any item not coated at the time of release will be coated prior to turnover. This action will be completed by the disciplines and by punchlists that will be formulated from these walkdowns. All punchlist items will be completed prior to acceptance by the client."

Based upon this response, the PCVT offers the following observations:

The response indicates that there currently are no controls in place to ensure that needed coatings touchups are tracked, completed, and verified; that current plans are to depend upon walkdowns to identify touchup needs.

The PCVT did not review any walkdown procedures, but reminds the project that, if this course of action is taken, the procedure(s) should address the need for 100% verification of coatings at all weldments (PCVT observations across commodities were that lack of touchup is widespread).

It must be remembered that touchup activities, which will be extensive, will include not only the touchup itself, but also surface preparation and inspections. Review of current procedures did not result in any observations of procedural controls for accomplishing any touchup related activities.

The practice of signing off (and submitting to RMS) of installation documentation with indicators that coatings are N/A is misleading. From a comprehensive records standpoint, the installation is not really complete. Widespread touchup at a later date could create a need for extensive supplementing of existing records to reflect their actual completion.

EXHIBIT 39BACKFILL RELATED PROCEDURE REVIEW

I. WPP/QCI-4.0, revision 10

A. General Comment:

The procedure addresses receipt and temporary storage/hold of backfill material (received as non-safety and upgraded after the availability of satisfactory test results). The procedure does not clearly address (or make reference to another applicable procedure) how required samples for the test will be taken, to whom the samples will be sent (e.g. - PTL), or even what tests are actually required.

* Recommendations:

Although no deficiencies were observed in actual practice, it is recommended that the procedure be revised to specifically address required tests and methodologies, along with the interface with the testing agency.

- * - Previously discussed PCRT commitment to revise WPP/QCI-4.0 adequately addresses this issue.

II. QCP-10.10, revision 3, with PCNs #1 - 3

A. ECW Backfill:

Paragraph 5.2 of the procedure excludes "... details necessary for inspection of excavation and compaction within the ECW pipe area ...", and no other procedure exists to address verification of work (or rework) in this area.

Paragraph 5.2.3.11 states that, "Backfill operations within the ECW area shall be accomplished in accordance with specific design requirements." The procedure makes references throughout which indicate that ECW backfill inspections are made; but based on the exclusion in paragraph 5.2, there are no procedural directions for accomplishing the inspections.

The PCVT recommends that project followup regarding this issue include a description of how ECW backfill inspections are accomplished, in accordance with what procedure; and, in the event that it is expected that the inspections are, in fact, to be accomplished in accordance with specific design documents, a description of the procedural steps found in the design documents which prescribe the inspection methodology should also be included.

B. Backfill Mapping:

No mapping of test locations is required to facilitate verification of compliance with requirements of test locations.

EXHIBIT 40CONCRETE RECORDS RELATED OBSERVATIONS

I. Concrete Placement Records

The records for the following concrete placements were reviewed:

CI-W73 (2-15-79) - Brown & Root
CA1-W2 (7-8-76) - Brown & Root
CI1-W33 (6-15-78) - Brown & Root
1FH-W-050-001, 003 (11-29-84) - ECI
1-RC-W-182-W003 (1-24-83) - ECI
1-RC-S-068-007 (8-8-84) - ECI
1-RC-W-221-019 (8-11-83) - ECI

It should be noted that records reviewed consisted of a random sampling of documents within each of the packages -- all of the documents in each package were not reviewed. In any event, those documents reviewed were determined to be technically adequate.

The major concern identified during this review deals with the filing methods employed for concrete records by the previous constructor Brown & Root (B&R). B&R records are arranged differently than those of ECI (with the ECI methods being preferred). All of the records applicable to any specific ECI concrete placement are contained in one file, and the timeliness of retrievability was observed as being very good. (Comparatively to this, it was observed that B&R records are contained in several different files, and the timeliness of retrievability was observed to be very poor, as it took approximately two (2) full days to assemble the three (3) B&R placements (listed above). A description of the situation observed is as follows:

- There is one file for B&R-initiated records such as pour cards, preplacement, placement, and postplacement records.
- There is one file for PTL in-process concrete test records such as slump, air content, temperature and batch tickets.
- There is one file for PTL compression test records.
- There is one file for cube (grout) breaks (PTL).
- There is one file for cadweld inspection records.

Although all requested records were ultimately obtained, the PCVT feels that the project is susceptible to adverse criticism regarding the timeliness of records retrieval, and recommends that considerations be given to a backfit effort which would effect a configuration of B&R concrete records in a format the same as which ECI records are being filed.

II. Cadweld As-built Records

A perceived excessive amount of time was required to produce as-built records for seven (7) of eight (8) cadwelds requested. The cadwelds requested were: 5H1266, 5H1267, 5H1268, 5H1269, 5H1270, 5H1271, 5H1272 and 5H1273. The "as-built" showed cadweld #5H1266. The location of the others was reflected on an attachment to NCR #S-C583. Traceability from the as-built was provided by a reference on the as-built to a FREA, which in turn references the NCR.

It should be noted that conditions observed do not apparently satisfy the explicit requirements of Regulatory Guide (R.G.) 1.10 with regard to cadweld as-built drawings. The R.G. states that, "The locations of all reinforcing bar splices . . . should be shown on the as-built drawings . . ."

PCRT response to this items was as follows:

"The project interprets that the intention of R.G. 1.10 is to provide the documentation of as built locations of the cadwelds and, in fact, as built drawings of cadweld locations are not necessary.

The B&R system, which is similar to our present system, provides the necessary documentation meeting R.G. 1.10 intent."

The PCVT does not consider this response to be adequately reflective of project compliance with regard to R.G. 1.10 requirements (not intent). The project's position regarding the, "Meaning of "should" and "shall" in NRC Regulatory Guides . . .", is as follows:

" . . . there is no distinction between the words "should" and "shall". Unless the . . . exceptions . . . are documented in a licensing submittal or the FSAR, both words connote a requirement."

EXHIBIT 41NON-SHRINK GROUT

FCR #BC-01607 was generated on February 6, 1985, to revise specification 2A010CS0027, revision 4, third paragraph of 5.6.2. Stated reason for the change was to provide specific criteria in the specification so that it can be the governing document rather than making reference to the manufacturer's recommendations. The PCVT concurs with this philosophy, but does not necessarily agree with the actual changes which were made in this instance.

The FCR changed the specification to read that flow cone tests are not required for premixed (non-shrink) grout.

As is understood by the PCVT, the purpose of a flow cone test is to ensure "workability" and therefore, adequate portioning of ingredients (e.g. - ice, water, powder).

It was observed that the manufacturer's recommendations which are found on the bag indicate that a flow of 20 to 30 seconds is to be used.

The PCVT feels that, although the philosophy of having a project document (e.g. - specification) take precedence over a manufacturer's recommendation for his product is good, the situation observed in this instance is not. This is due to the fact that the FCR, in establishing the specification as the controlling document, has deleted the requirement to test grouting mixes, and there now appears to be no measurement attributes at all.

Feedback from HL&P Engineering on this issue was that they concur with the PCVT in that, "... these test requirements should remain in the specification."

Subsequent PCRT response was as follows:

"The project is responsible for recommending the basic requirements and may utilize manufacturer recommendations as appropriate.

In this particular case, the manufacturer had performed flow cone tests for maximum water/cement ratio. The engineer established conditions within the limits set by the manufacturer. Performing flow cone tests in the field would have been a duplication of work. Therefore, these tests were deleted from the specification.

The manufacturer, Master Builder, concurred with the deletion of the flow cone tests."

The PCVT feels that the performance of field cone tests is not representative of a duplication of the manufacturer's test; rather, it would serve as individual verification of proper mixes. It is recommended that this issue be readdressed by the project.

EXHIBIT 42CONCRETE INSPECTION PROCEDURE REVIEW

I. QCP-10.1

No comments.

II. QCP-10.2

| <u>Comment #</u> | <u>Paragraph</u> | <u>Comment</u> |
|------------------|------------------|---|
| A. | 5.2.7.2.3 | The procedure requires that the operating cycle of all new concrete vibrators be checked prior to initial use and thereafter as "deemed necessary". The ACI-309 Code (referenced in applicable specification 2A010CS1009, revision 4) requires that the operating cycle of concrete vibrators be checked before each placement. (Note: During placements witnessed by Pre-CAT personnel, vibrators were neither checked immediately before, nor during concrete placement activities.) |
| B. | General | Most specification requirements are addressed by the QCP and/or the attached inspection reports, but specific details of those reports are often not addressed by the procedure (i.e. - prohibition of wire tie use, verifying that plumbness and levelness are within tolerance, allowing the removal of 6" maximum of concrete to facilitate re-embedment of any item, etc.). These items should at least be recorded on a checklist or the "to be completed" inspection report in order to reduce the number of documents required in the field. |
| C. | 5.2 | In section 5.2 (Inspections), reference is made thirteen (13) times to nine (9) different reference documents for acceptance criteria needed to complete the required inspections, rather than include the criteria in this procedure. |

III. QCP-10.3

- | | | |
|----|-----------|---|
| A. | 5.2.1.4.5 | <p>Specification 2A010CS0001, revision 7, paragraph 8.3.2.B, allows the addition of water to the concrete one (1) time at the delivery site provided the following conditions are met:</p> <ol style="list-style-type: none"> 1. Amount is within limits noted on batch ticket. 2. Concrete is subsequently mixed for a minimum of thirty (30) revolutions. |
|----|-----------|---|

| <u>Comment #</u> | <u>Paragraph</u> | <u>Comment</u> |
|------------------|------------------|----------------|
|------------------|------------------|----------------|

A. (continued)

3. Amount added is accurate to within \pm one (1) gallon, and is documented on the batch ticket.

Restrictions 2. and 3. are not addressed in the procedure, nor are they covered by the different (although not necessarily incorrect) restrictions which are listed in the procedure.

IV. QCP-10.4

A. Attachment B The "Postplacement Inspection Report" form and the subject procedure do not address verification for compliance to the following requirements of specification 2A010CS1009, revision 4.

1. No evidence that wire ties were used.
2. Surfaces to receive a waterproofing membrane are to have a smooth form or float finish.
3. Tie holes and defects (in "rough form finish" surfaces) are patched, and fins exceeding $\frac{1}{4}$ " in height are chipped or rubbed off.
4. Holes and defects (in "smooth form finish" surfaces) are patched, and all fins are removed.
5. Rock pockets or voids larger than $\frac{3}{8}$ " in diameter or $\frac{1}{4}$ " deep are not acceptable and must be repaired.
(Note: Acceptance/rejection and resolution of cracks in reinforced concrete is not addressed in either the subject procedure or the specification. Concrete cracking was addressed as a concern and observation by the NRC CAT inspectors at Waterford and River Bend, respectively.)

B. 5.2.3,
5.2.7

Neither the procedure, nor the applicable attached form, address the following specification (reference 2A010CS1009) criteria for determining acceptance/rejection of voids in concrete.

- a. (Paragraph 5.13.3.5) Voids around sleeves or penetrations exposing rebar or deeper than maximum allowable cover shall be classified as structural.

| <u>Comment #</u> | <u>Paragraph</u> | <u>Comment</u> |
|------------------|------------------|----------------|
|------------------|------------------|----------------|

B. (continued)

b. Holes through the thickness of walls and slabs, due to taper ties, or abandoned core drillings up to 6" in diameter, are filled with solid drypack or non-shrink grout after preparation. (Outer $\frac{1}{2}$ " to 3" of hole may be filled with a compatible epoxy.)

C. 5.2.8(1)

Replacement concrete, when used for large voids or voids extending through a wall or behind rebar, shall be the same type and class of concrete used in the original placement (unless otherwise reviewed and accepted by the Engineer).

V. QCP-06

A. General

Specification paragraph 4.1 states that essential "variables shall be checked at the start of each production period and corrections made as necessary." There are no instructions for QC to verify that this check is made and no provisions to record the results of this check.

B. 5.1

Specification paragraph 7.1 states that, "Welders and/or welding operators shall be qualified in accordance with the applicable code and job specifications", but the procedure does not clearly address this prerequisite.

C. 5.2

Specification paragraph 4.4.6 requires that, "Arc shields (ferrules) shall be broken free from all studs after welding", but the procedure does not provide direction to verify that this is done.

VI. QCP-10.23

No comments.

VII. QCP-10.24

A. 5.2.1

(Typical grout applications) No. 3 - Specification 2A010CSI009, paragraph 5.14.5.1.1, involving the requirement that anchor bolt sleeves be filled with drypack consistency non-shrink grout, is reduced to an option in the subject procedure. Also, the applicable Attachment A Inspection Report Form does not allow space and directions for recording the verification of compliance.

| <u>Comment #</u> | <u>Paragraph</u> | <u>Comment</u> |
|------------------|------------------|--|
| B. | 5.2 | The specification 2A010CS1009 prerequisite that anchor bolts be positioned in place and grouted prior to grouting the applicable base plate, sole plate, or equipment pad, is not addressed by the subject procedure, nor the attached Form for recording verifications. |
| C. | 5.2.2.3 | The specification (2A010CS1009) requirement that drilled holes (when required) must be 1" to 2" larger in diameter than the rebar or anchor bolt for the depth specified is not clearly addressed on the inspection report form, which is applicable for verification of compliance. |

VIII. QCP-10.25

| | | |
|----|---------|--|
| A. | 5.2.1.3 | Specification 2A010CS0002, paragraph 4.2, requires that reinforcing steel shall <u>not</u> be welded during fabrication. This is not addressed for QC verification by the subject procedure. |
| B. | 2.0 | In order to comply with specification CS0002 and CS1003 requirements, reference to, or indirect quoting of, applicable sections of ACI-315-74 and 318-71 is required, but neither of these two ACI Codes is referenced in the procedure. |

IX. CS-0014 (Champion batch plant inspection)

| | | |
|----|---------|--|
| A. | General | This procedure's content is quite sparse, addressing only a few of the steps and functions related to concrete batch plant operation. Some requirements for verification of certain activities is included, but no inspection report form on which to record results is included. Procedure CS-0006, revision 1, is referenced and does contain additional inspection requirements, including a checklist form on which to report results, but not all batching activities are included. |
| B. | General | Some of the items or activities not adequately addressed by the subject procedure, nor any of the other Quality procedures identified from CS-0001 through CS-0034, include: <ul style="list-style-type: none"> - The existence of a backup batch plant (as required by specification 2A010CS0001, revision 7) and any special controls or requirements applicable to it. |

| <u>Comment #</u> | <u>Paragraph</u> | <u>Comment</u> |
|------------------|------------------|----------------|
|------------------|------------------|----------------|

| | | |
|----------------|--|--|
| B. (continued) | | <ul style="list-style-type: none"> - Operation of the plant in the "Automatic Mode". - Mix selection by a punch card system and related controls. - Any controls related to the digital recorder. - Calibration frequencies for scales, meters and dispensers/timers are addressed in procedure CS-0025, revision 2, but this procedure is not referenced in any of the procedures requiring calibration of this equipment (i.e. - CS-0003, revision 0; CS-0004, revision 0; CS-0007, revision 0; CS-0008, revision 0; and CS-0016, revision 0). |
|----------------|--|--|

C.

General

Neither the subject procedure, nor any of the other thirty-three (33) procedures, have been developed based on a standard format; they are instead simply listings of items of information or requirements. The procedures have no scope, no statement of responsibilities, usually no reference to other applicable documents, and often have minimal instructions on how to perform the applicable inspection activity.

EXHIBIT 43

HILTI-KWIK BOLTS

An investigation was performed to evaluate the documented history of Hilti-Kwik bolts on STP. This investigation was initiated after the PCVT review of B&R CAR #0385, which documented the fact that Hilti bolts were being installed on STP without benefit of the testing program as required by the applicable Technical Reference Document (TRD).

Documents utilized and reviewed during this investigation included the following (References):

- 1) B&R CAR #0385
- 2) B&R TRD #5A010SQ010, revision H/5A019SQ010, revision G ("Design Installation, Testing and Inspection of Concrete Expansion Bolts" dated January 7, 1982)
- 3) Weiss, Jenney, Elstner and Associates, Inc. report, dated May 29, 1981, "Tension, Shear and Relaxation Testing of Expansion Anchors at the South Texas Project, Bay City, Texas, for Brown & Root, Inc."
- 4) ESI NCR #EC-00037, dated April 30, 1982
- 5) B&R NCR #SM-3283, dated January 29, 1980
- 6) BEC specification #5A010SS1000, revision 6, dated January 11, 1985, "Specification for Installation of Expansion Anchors, Rock Bolts, Grouted Anchor Bolts, and Core Drilling."
- 7) ESI QCP-10.19, revision 6, dated February 28, 1985, "Inspection of Anchoring Devices Installed Within Concrete Structures."
- 8) Bechtel STP Transition Phase Draft Final Report, Attachment C, covering Hilti bolts.

The following details PCVT review results regarding this subject, including those concerns which were identified during the review.

As previously stated, the B&R CAR (reference 1) was initiated to document failure to comply with applicable TRD requirements (reference 2). Subsequent to this CAR, B&R initiated NCR SM-3283 on January 29, 1980 (reference 5). On January 3, 1982, after transfer of A-E and constructor responsibilities on STP, B&R initiated a memorandum to the Material Review Board which stated in part that, "The B&R Engineering Office will be able unable to provide a complete disposition for the subject NCR. This document is therefore considered to be an open item which is to be processed by others at a future time."

NCR #EC-00037 (reference 4) was initiated by ESI on April 30, 1982, as a "rollover" of the B&R NCR into the new system, and was subsequently dispositioned by BEC on August 1, 1983. As of June 18, 1985, this NCR remained in an open status.

In an effort to ensure that the conditions adverse to quality which were identified by B&R in 1980 have been comprehensively and adequately rolled over and covered under the current systems, the PCVT made a comparison of the previous requirements and information regarding Hilti bolts to that which exists today. Based upon the results of this comparison/evaluation, the PCVT has concluded that the requirements for installation and acceptance of anchor bolts are now less stringent than those recommended as a result of previously performed qualification testing by an independent consultant.

The previous A-E (B&R) developed, issued and implemented a program for the design, installation, testing and inspection of concrete expansion anchors, which is defined in the TRD (reference 2). Related to this, the following occurred:

- Three (3) test blocks were made. Each test block had #7 reinforcing steel. One (1) test block consisted of grout only. The other two (2) were concrete - one with 3/4" aggregate, and the other with 1 1/2 inch aggregate.
- Cylinders, cubes (grout test blocks), and cores were taken to assure that the blocks had reached design strength prior to the start of any testing activities.
- An independent testing agency, Weiss, Jenney, Elstner and Associates (WJE), was contracted to perform the actual testing on each of the three test blocks. Detailed parameters of each test performed, spacing of the Hilti bolts, test results, and much additional information were contained in the WJE report (reference 3).

During transition to the current project organization, BEC apparently only reviewed the B&R TRD. A review of Attachment C to the STP Transition Phase Draft Final Report (note that a Final Report could not be produced for PCVT review), which addresses Hilti bolts (reference 8), revealed the following BEC statement: "Based on the comparison of concepts used to develop anchor bolt standard load capacities between BEC and B&R practices, it is concluded that the concept used by B&R (embedment length developed by bond alone) is extremely conservative, and it is therefore recommended that the Bechtel concept of developing anchor bolt capacities (failure of concrete in cone pull out) be utilized to optimize construction cost."

While the previous B&R TRD was supported by the WJE test results which documented actual tension, shear and relaxation values (also included failure results of concrete cone pull out), there do not appear to have been any actual physical demonstrations performed on STP to substantiate the adequacy of the adopted Bechtel concept in place, which is reflected in specification 5A010SS1000 (reference 6). Some of the disparities which were observed between the B&R TRD and the current BEC specification (which is closely reflected in the applicable ESI QCP (reference 7)) are as follow:

- A. The TRD addressed four (4) specific areas where anchor bolts were not to be used (TRD section 2.0). These areas were at the outside face of the containment shell, through any steel liner, at a turbine pedestal or any vibrating structure, or in certain grout placements. The current specification contains no such restrictions.

- B. The TRD required that no expansion bolts be installed until the concrete reached an age of twenty-eight (28) days. The current specification, on the other hand, allows installation of bolts after a minimum of fourteen (14) days or when the concrete reaches ninety percent (90%) of design strength.
- C. The TRD required maintenance of marked up drawings indicating the locations of grout placements. The current specification does not include this requirement, nor are such drawings actually being maintained.

It should be noted that, in the WJE report which documented test results for the B&R TRD, the following statement exists on page 35: "The compressive strength for the grout mix . . . varied from 4802 to 5849 psi." (Note that design strength was 4000 psi.) "The only anchors which met the manufacturer's rated capacity are the 5/8 inch diameter in shallow embedment. All other anchors tested in tension for this initial series were below" The report went on to indicate that a second set of tests resulted in the acceptability of 3/8 inch and 1 1/4 inch anchors in deep embedment only. This report further speculated that, "Other types of anchors may perform better than the Hilti-Kwik bolt in a grout mix."

Thus, the restriction was imposed on the use of Hilti bolts in grout and the requirement to "map" grout placement locations for tracking.

- D. The TRD stated (on page 8) that all supports designated as ASME, subsection NF shall use two nuts and one flat washer for locking expansion anchors. Specification 5A010SS1000 does not address NF supports. Additionally, a review of the specification for installation of NF supports (5L340JS1002) indicates that this requirement is not reflected there either.
- E. The WJE report which supports the TRD states that, ". . . 6% out of plumbness is acceptable. After the anchor hole has been drilled to its intended depth, a "Go/No-Go" gauge having a 6% taper should be used to check alignment." The current specification addresses use of a "Go/No-Go" gauge, but does not address the 6% taper criteria.

One area where the BEC disposition to NCR #EC-00037 was in conflict with the TRD was observed, and is as follows: Item 7.1 of the TRD stated that "All installed bolts for safety related items, and twenty percent (20%) of the bolts for non-safety related items shall be visually inspected prior to acceptance." On page 17 of the ESI NCR, the disposition for expansion anchors installed for non-safety related applications in either Category 1 or non-Category 1 buildings is "use-as-is".

Based upon the observations made by the PCVT during this part of the investigation, it is recommended that the relaxation of requirements which was effected during transition from previous to current A-E organizations, be re-reviewed by HL&P Engineering to ensure that those decisions made at that point in time were technically sound and are verifiably defensible.

EXHIBIT 44EXPANSION ANCHORS INSPECTION PROCEDURE REVIEW

I. QCP-10.19

| <u>Comment #</u> | <u>Paragraph</u> | <u>Comment</u> |
|------------------|------------------|--|
| A. | General | In the PCVT's opinion, this procedure contains too many complicated advance changes, adding to the difficulty of following procedure requirements and increasing the chance of error in interpretation. |
| B. | 5.2.1.3 | Specification 5A010SS1000, paragraph 5.1.3, requires that the Site Engineer be notified when center-to-center spacing of expansion anchors, rock bolts, anchor bolts and/or drilled and grouted bolts is less than the specified minimum. The subject procedure does not address this requirement. |
| C. | General | It does not appear that the requirements for reporting deficiencies in accordance with the site nonconformance program for resolution are clearly addressed by this procedure. |
| D. | 5.2.1.1 (7) | The specification (5A010SS1000, paragraph 5.4.3) requirement of concrete strength prerequisite for installation of expansion anchors (90% or 14 days) is not addressed in the procedure inspection report form to record compliance. |
| E. | General | The use restrictions for plate washers, as stated in specification SS1000, paragraph 5.4.4, are not addressed in this procedure. |
| F. | General | The applicable restrictions for redrilling to relocate expansion anchors have not been addressed in QCP-10.19. |
| G. | 2.0 | Although drilling, and subsequently inspecting, holes in concrete is necessary to perform many of the activities of QCP-10.19, procedure QCP-10.33, "Inspection of Drilled Holes and Cored, Chipped or Cut Penetrations Through Hardened Concrete", is neither referenced nor addressed in this procedure. |
| H. | 5.2.1.1 | The specification (SS1000, paragraph 5.4.15) requirement that the flat washers supplied with the concrete expansion anchors are to be used unless otherwise specified is not included in the QCP-10.19 list of installation requirements. |
| I. | General | Space to record verification (or related recording instructions) of compliance with mandatory specification requirements is not always clearly provided on the attached applicable inspection report form to the subject procedure. |

EXHIBIT 45BOLT TORQUING VERIFICATION

I. Connections visually checked only

A total of sixty (60) bolted connections received a visual examination only by the PCVT. All connections are located in RCB Unit I at elevation (-)2' - 0". Of these 60 connections, anomalies were observed with eight (8), or thirteen percent (13%), of the connections reviewed. Detailed observations made regarding these 8 connections are as follow:

| <u>Location</u> | <u>Observed Condition</u> |
|-------------------------------------|---|
| AZ 198 ⁻ - 30' | 2 missing bolts |
| (approx. 6' from liner plate) | |
| AZ 42 ⁻ - 30' | no paint touchup* |
| AZ 58 ⁻ - 0' | no paint touchup* |
| AZ 106 ⁻ - 30' | no paint touchup* |
| AZ 270 ⁻ - 0' | no paint touchup* |
| AZ 78 ⁻ - 0' | no paint touchup* |
| AZ 198 ⁻ - 30' (west of) | different clip angles for beams 2 connected to the same supporting beam** |

* - These connections were completed from six months to two years ago.

** - specifically discussed in body of summary

II. Connections checked visually and for torque

A total of seventy-three (73) bolted connections were checked both visually and for torquing adequacy. These connections are located within the Unit I RCB, DGB and MEAB. The bolts were torqued to 525 foot pounds (ft/lbs). This value was determined at the beginning of the day (June 7, 1985) with three (3) like bolts tested in a Skidmore-Wilhelm tension instrument at 39 KIPS* per AISC, and the results are as follow:

Bolt 1 - 540 ft/lbs @ 39 KIPS - 7/8" A325 - 1/3 T.O.N. **
 Bolt 2 - 490 ft/lbs @ 39 KIPS - 7/8" A325 - 1/3 T.O.N. **
 Bolt 3 - 540 ft/lbs @ 39 KIPS - 7/8" A325 - 1/3 T.O.N. **

Average = 525 ft/lbs

* - One (1) KIP equals one thousand (1000) pounds of tension.

** - turn of the nut

Of the 73 connections checked, anomalies were observed with seven (7), or ten percent (10%), of the connections reviewed. Detailed observations regarding these 7 conditions are as follow:

| <u>Location</u> | <u>Connection*</u> | <u>Observed Condition</u> |
|--|--|--|
| RCB I, elevation 68', AZ 185° | (1) 506B2 - 506B1 516B2 - 513B1 | slotted connection - no double nuts bolts slightly loose - tightened during torquing |
| RCB I, elevation 52', AZ 332° | (2) 414B4 - embed | 4 of 9 bolts missing |
| RCB I, vertical diagonal from elevation 37' to 52', AZ 62° | (3) 339K1 diagonal bolting to 429B1 | 8 of 8 bolts loose |
| RCB I, elevation (-)2', AZ 159° - 30' | (2) F107PM3 to column C7 splice plate | loose bolts |
| RCB I, elevation (-)2', AZ 25° - 30' | (3) column base plate | 1 nut missing, 1 nut loose, some thread damage at column C-2 (where nut is missing) |

* - Each connection equals a minimum of four (4) checked bolts.

It should be noted that inadequate torque accounted for five (5) of the 7 connections observed with anomalies, or approximately seven percent (7%) of the total sample checked for torque.

- (1) - PCRT response indicates that double nuts are not required in this application; that the slotted connection is for ease of installation.
- (2) - Covered by NCR CC-02855
- (3) - ESI QA issuing SDRs E-247 and E-248

EXHIBIT 46STRUCTURAL STEEL INSPECTION PROCEDURE REVIEW

The following procedures were reviewed against the requirements of specification #3A010SS0030, revision 4, (with all applicable changes) and were also assessed for "workability" from a user standpoint:

QCP-9.5, revision 5 w/ PCRs #1 and 2
 QCP-10.5, revision 4 w/ PCRs #1 through 5
 QCP-10.7, revision 5 w/ PCRs #1 through 7

Although none of the comments generated during procedure reviews relate directly to any hardware problems observed in the plant, the PCVT offers the following observations and recommends that appropriate considerations be given each regarding procedure revisions. It is anticipated that incorporation of these comments will result in more concise and "workable" procedures for those individuals tasked with implementing them.

I. QCP-9.5

| <u>Comment #</u> | <u>Paragraph</u> | <u>Comment</u> |
|------------------|------------------|--|
| A. | 5.1 | Procedure QCP-9.5 does not contain requirement for QC verification of weld procedure nor welder performance qualifications as a prerequisite to starting welding (reference specification SS0030, Appendix C). |
| B. | General | Specific specification requirements for welding pipe whip restraints per AWS D1.1 subject to the acceptance of criteria of Appendix A; Category A joints are not addressed by this QCP (also see QCP-10.12, paragraph 1.1). |
| C. | General | Specification requirements for verifying welding of stainless steel to carbon steel are not addressed in QCP-9.5. |
| D. | General | The following specification requirements are not addressed for QC verification (or recording of results verification) in the subject procedure: <ul style="list-style-type: none"> - Connections calling for seal welds shall have the structural weld completed and accepted first, as applicable, then shall be continuously sealed around the contacting surfaces (see spec. paragraph 5.3.2.5). |

| <u>Comment #</u> | <u>Paragraph</u> | <u>Comment</u> |
|------------------|------------------|--|
| D. (continued) | | <ul style="list-style-type: none"> - Repaired welds shall be examined by the same method used to examine the original weld (see spec. paragraph 5.3.2.6). - Welders' qualification for tube steel shall be on pipe or plate (see spec. paragraph 5.3.2.11). |
| E. | General | Removal of splatter, slag and flux cleaning of surfaces before touchup is not addressed for QC verification by this procedure (see spec. paragraph 5.4.2). |
| F. | General | Neither touchup of welded surfaces nor status to assure subsequent followup for paint touchup is addressed by this procedure. |
| G. | 5.2.12 | Weld dimensions, omissions, additions and cracks are addressed by the subject QCP, but the applicable Inspection Report does not provide for recording of the results (see spec. paragraph 6.1.6.1). |
| H. | General | In process weld inspection per ANSI N45.2.5 requirements is not addressed by the subject procedure (see spec. paragraph 6.1.6.1). |
| II. QCP-10.5 | | |
| A. | General | The specification requirement (reference 3A010SS0030, paragraph 5.5.1.2) prohibiting burning of bolt holes is not addressed by the subject procedure. |
| B. | PCRs | Eleven (11) pages worth of advance changes dated from November 1984 to May 1985 make the procedure difficult to follow. |
| C. | 5.2 | The inspection requirements of SS0030, paragraph 6.1.5.2 that inspection aspects for in-process surveillance including (among other attributes) size, edge distance and configuration of bolt holes and proper use of tools are not addressed by the subject procedure nor the attached, applicable inspection report. |
| D. | General | Like many other QCPs, the inspection report(s) form(s) for this procedure and the applicable instructions often require verification of many different aspects for one sign-off verification |

| <u>Comment #</u> | <u>Paragraph</u> | <u>Comment</u> |
|------------------|------------------|----------------|
|------------------|------------------|----------------|

D. (continued)

on the inspection report. The use of a multi-item checklist for criterial aspects, such as hole edge distance, would provide more confidence in verification results and make work easier for the inspector.

III. QCP-10.7

- | | | |
|----|--------------|---|
| A. | General | Seven (7) advance changes of twenty (20) total pages affecting fourteen (14) pages of the basic procedure make following the latest instructions nearly impossible. In addition, twenty-one (21) reference documents (12 of which are design specifications) further complicate understanding of the procedure. |
| B. | Attachment A | Specification 3A010SS0030, revision 4, paragraph 6.1.4, requires 100% inspection of configuration and bolting upon completion of the work and surveillance of certain assembly attributes which are not accessible upon completion for final inspection. Verification of these attributes is not clearly addressed, nor is it provided for by the subject procedure or the Attachment A inspection report form and the applicable instructions. |
| C. | Attachment A | Verification of satisfactory coatings repair or touchup is not addressed, nor is any other applicable procedure referenced. |

EXHIBIT 47COATINGS INSPECTION PROCEDURE REVIEW

The Ebasco Quality Control procedure for protective coatings inspection, QCP-10.8, revision 5 with PCR #1, was reviewed against the requirements of specification 3C080AS1001, revision 10 (with all applicable changes). Comment "A" is indirectly related to a records concern noted during the coatings record review, but no hardware problems or concerns were noted during the inspection. Therefore, the following comments are offered in anticipation of improving "workability" of the procedure:

| <u>Comment #</u> | <u>Paragraph</u> | <u>Comment</u> |
|------------------|------------------|---|
| A. | 5.1.6 | Specification 3C080AS1001, revision 10, requires that the Contractor's QA program provide for certification of personnel performing activities that affect quality. The subject procedure does not provide a prerequisite for QC verification of compliance with this requirement. The procedure's attached form does provide for recording names of coating applicator personnel. |
| B. | 5.2.2.1B | This paragraph requires QC inspectors to " . . . determine action(s) required for acceptable surface preparation . . . ", but the procedure does not define how these "actions" will be monitored or controlled. For example, specification paragraph 6.7.7 allows for the use of coating material standard ES-04 to fill "bugholes" and other concrete surface imperfections up to 1/4" in depth and 1/2" in diameter, but this option is not addressed by the procedure. As a minimum, the instructions used for monitoring the remedial actions required for an acceptable surface should be referenced in this procedure. |
| C. | Attachment 1 | Paragraph 9.1.5.1 of the referenced specification requires performance of adhesion tests " . . . as directed by Bechtel Project Engineering . . . ", but adhesion tests are not addressed in the subject procedure. (Per BEC Engineering, adhesion tests are usually performed as part of an approved, detailed NCR disposition including test requirements.) It is recommended that adhesion test requirements be defined in the subject (or other appropriately referenced) procedure. |

| <u>Comment #</u> | <u>Paragraph</u> | <u>Comment</u> |
|------------------|------------------|--|
| D. | 5.2.5.4A | Dry film thickness acceptance criteria is not included in the procedure (e.g. - specification AS1001, paragraph 10.8, requires that dry film thickness of concrete coating standard C-208H topcoat does not exceed 14 mils). |
| E. | 5.2 & 3.0 | Attachment J is referenced throughout this section of the subject procedure, but it is not attached, nor is it included in the list of attachments. (Attachment J may have been incorrectly noted in place of Attachment I.) |

EXHIBIT 48COATINGS OBSERVATIONS

I. Storage Facility Review

Four (4) protective coatings storage areas (including the receiving inspection warehouse facility (Warehouse G), Units 1 and 2 satellite storage facilities and the paint shop storage facility) were reviewed to verify compliance with specification and program requirements. Attributes reviewed included temperature, material expiration dates, temperature recording equipment calibration and document control requirements. A total of eighteen (18) coatings containers were randomly selected from the 4 storage areas to verify compliance with batch expiration dates. One (1) conflict between the expiration dates recorded in a Warehouse G container and the applicable bin control card was satisfactorily resolved during the evaluation. No other problems or concerns were noted with respect to protective coatings storage.

II. Review of Field Inspections

An Ebasco QC inspector was observed using a profile comparator to accept/reject the results of sand blasting six (6) miscellaneous duct pieces in the paint shop. Additionally, the paint shop facility was examined for ventilation and for segregation of blasting and coating application areas. No problems or concerns were recorded. Coating application activities were not being performed; therefore, no examinations were performed in this area.

III. Protective Coatings Records Review

Protective coating records were reviewed in the following three (3) areas:

- Ebasco QC personnel certification
- Certification of applicator personnel
- Nine (9) coating records packages

The certification dates for two (2) of three (3) Ebasco QC coatings inspection personnel reviewed had expired, resulting in an observation that HL&P RMS records of Ebasco QC inspection personnel certifications are not being maintained current. Current certification records were subsequently found in the possession of Ebasco records personnel.

The certification record for one (1) applicator was reviewed and was found to be in compliance with the applicable Construction Site procedure, CSP-30. The concern noted is that there is no QC procedure addressing QC inspection personnel responsibilities for construction applicator personnel certification. FSAR Table 3.12-1 and Item 6.1.2.1 were reviewed to verify the STP commitment to Regulatory Guide 1.54. It should be noted that Regulatory Guide 1.54 addresses ANSI N101.4, but specifications 3C080AS1001 and 4C080AS1007 do not.

A total of nine (9) coating records packages were reviewed to assure the following:

- Traceability by batch number from the point of application to the product identity certification,
- The exact identity of the coating materials used,
- That any deviation from procedure is recorded on NCR forms, and
- That wet bulb, dry bulb, relative humidity and dry film thickness data are included in the inspection report.

Although the aforementioned items were found to be in compliance with procedure commitments, one (1) concern was identified: The present program does not address a means of determining when a room or area is complete. Ebasco QC is maintaining a status chart that addresses, by room number, the applicable inspection report number including any rework. It is recommended that this status chart be procedurally addressed and become part of the records required for turnover.

It was also noted that none of the safety related coating records (Ebasco) had been turned over to HL&P RMS. It is recommended that Ebasco QC coordinate with appropriate Ebasco records personnel to initiate a method of determining when a package can be turned over. Realizing that touchup may be occurring after fuel load should not prohibit the turnover of some record packages.

IV. Material Control/Traceability/Protection

A. Traceability/Control/Identification

Throughout the course of the Pre-CAT verification, one of the PCVT verification attributes which was continuously considered was traceability, identification and control of items and materials. A number of observations were made in that regard which indicated that areas of deficiency and/or room for improvement exist. The following is an overview of observations made (may not be all-inclusive).

1. Section I.B.2.b. of this report details a PCVT concern regarding traceability of radioactive isotopes used in the RT process (does not apply to permanent plant material control).
2. Section I.E.2. of this report details, in part, a PCVT concern regarding a possible material control problem with regard to possible undetected (or undetectable at present) use of restricted items (huck bolts) in certain specific areas of the plant.
3. Items 1. and 2. of Exhibit 2 detail observed deficiencies with regard to items' deficiency.
4. Exhibit 9, almost in its entirety, details PCVT observations which could be indicative of a material control problem with regard to dye penetrant material used for the PT process (does not apply to permanent plant material control).
5. Item 8 of Exhibit 16 details an observation made where a pipe hanger for the Safety Injection System was actually installed on the Component Cooling System.
6. Exhibit 25 details, in part, a potential material control issue with regard to the use of H. B. Fuller Company #32-14 sealant.
7. Section II.A.2. of this report details, in part, PCVT observation with regard to an apparent use of excessive amounts of electrical cable.
8. Section II.A.4. of this report details, in part, a PCVT concern with regard to item identifications (installation of nameplates/nameplates falling off).
9. Section II.A.5. of this report details, in part, two (2) PCVT observations regarding missing item identifications/color coding (it was determined that these related to "in-process" items, so no defined deficiency existed).
10. Section II.A.6. of this report details, in part, PCVT observations regarding cable conductor color coding (cables were to be orange; actually were pale yellow). Although extensive discussion regarding this issue between the PCVT and PCRT

ultimately resulted in a determination that regardless of the cable conductor's appearance, they were acceptable, the PCVT offers a recommendation that, for all future procurements of cable, the suppliers be required to submit a sample of the cable in the colors in which it is to be provided. Those samples can then be utilized as comparative acceptance criteria in the event that questions regarding color interpretations arise.

11. Section II.B. of this report details, in part, a lack of specific material traceability of electrical support material (material is obtained in bulk shipments, and specific piece-to-piece traceability is not maintained).
12. Section III.A. of this report details, in part, PCVT concerns regarding material control adequacy as it pertained to receipt of quantification of Cat 1 backfill material (has been satisfactorily resolved).
13. Section III.C. of this report details, in part, a PCVT concern with regard to the clarity of procedural revisions for the control and traceability of expansion anchor material.
14. Section III.D. of this report details, in part, observed deficiencies concerning the identification/control of structural steel bolting material (to preclude reuse). The PCVT considers this to be one of the more serious issues identified regarding material control.

This same section of the report addresses two (2) other areas of material control - one (1) regarding the use of galvanized bolts (acceptable response received), and one (1) regarding the use of cadmium plated bolts (additional project action recommended).

B. Storage/Staging

The PCVT observed, on a generic basis, that the storage and protection being provided to items, equipment and materials by BEC after receipt and prior to issuance to the field was good. However, the storage and protection being afforded these same items by ECI after issuance and prior to installation was found to be generically inadequate. Although storage areas were identified by signs indicating the required level of protection, it was generally determined that the actual protection being provided did not meet the required levels. Storage areas were dirty, items and equipment were not being protected from the elements, non-permanent plant items (e.g. - mops, buckets, boxes, etc.) were being kept in designated storage areas, and so on. There were numerous observations made where items (e.g. - piping, valves, hangers, etc.) were lying about the plant on the floor being afforded no protection whatsoever.

The PCVT determined this to be a generic deficiency and issued SDR H-089 to document the condition. This issue will be resolved under separate cover.

C. In-place Protection

As with interim storage and staging discussed in IV.B. above, the PCVT concluded that the in-place protection being afforded items and equipment in the plant was generically inadequate. Examples of deficiencies observed are as follow: Use of carbon steel chain falls on stainless steel pipe; attachment of air lines to stainless steel pipe using carbon steel wire; temporary (widespread) suspension of stainless steel piping using carbon steel wire; unprotected electrical cables (numerous conditions).

As a result of this determination, the PCVT issued SDR H-097 to document the condition (will be resolved under separate cover).

D. Maintenance

With the exception of reviews made concerning mechanical equipment, maintenance was not a subject of direct verification by the PCVT. Section I.D. and Exhibits 18 and 19 of this report (covering mechanical equipment) detail PCVT observations regarding equipment maintenance and are relatively extensive when considering the fairly small sample selection.

Another maintenance related issue is detailed in Exhibit 30 of this report and deals with post-system/pre-area turnover maintenance of 1E batteries.

E. Housekeeping

At the beginning of the Pre-CAT verification effort, the PCVT observed that housekeeping, on a general basis, was inadequate. This was conveyed to the PCRT on a regular basis either by verbal or written communication. As a result, the project has embarked upon an energetic cleanup program throughout the plant (especially in Unit 1), and continuing PCVT observations from that point forward indicated that overall plant cleanliness is steadily improving at a notable rate.

While the improvements to date have been remarkable, the PCVT offers the following observations. It is felt that, without the increased amount of scrutiny afforded to identified items during the Pre-CAT verification effort, the possibility exists that the observed improvements would not have occurred. The project is reminded that the topic of housekeeping is a prime candidate for scrutiny by others, and that initial observations upon entering the plant will have a definite influence on others' conceptions regarding the perceived overall degree of care provided to items, equipment and installations by the licensee and its responsible agents.

Another point which must be considered is that housekeeping is perhaps one of the most susceptible areas of the project where "backsliding" can occur. It is recommended that once current improvements have rendered overall plant cleanliness to be at an acceptable level, the degree of attention being applied to making those improvements be continued into an ongoing, dedicated effort to ensure that those acceptable levels are maintained.

V. Design, Procedures, Document Control

A. Design

Design adequacy and control was an ongoing, indirect review attribute throughout the course of the verification. During formulation of the checklists utilized by the PCVT, the design was assessed from a standpoint of adequacy and "workability" (to the user), including translation of FSAR requirements. The assessment, however, should not be construed by the project as having had covered all applicable design elements in a "vertical slice" from the FSAR down. Only selected elements were reviewed. Also assessed on an indirect basis was the adequacy of design control, including any possible effects of perceived deficiencies or weaknesses of affected items and equipment.

A number of design and design control issues were identified during the verification effort, some of which were assigned as contributing factors relating to affected plant installations. A summary of issues identified is as follows.

1. Section I.C.1.h. of this report details PCVT observations regarding design "workability" and adequacy as it applies to the installation and inspection of pipe supports. In some instances, the design is considered to be, as a minimum, vague, and in others, inadequate. The workability of the design to user personnel was determined to be less than desirable. Also related to pipe support design, but not specifically indicated in Exhibit 15 of this report is a condition where many of the attributes determined by the PCVT to be unsatisfactory have no defined acceptance criteria in applicable design documents. This is considered to be indicative of design omission.
2. Section I.D., in part, and Exhibit 19 of this report detail design related inadequacies with regard to the use of unapproved vendor manuals in determining maintenance requirements for mechanical equipment.
3. Section I.E.1. of this report details, in part, observed shortcomings with regard to design workability in establishing the applicable acceptance criteria for HVAC supports. It was determined (as with other commodities) that the amount of research needed in order to extract the applicable criteria for inspection (or installation) combined with the quantity of design document-allowed variations from design, made it cumbersome (and confusing) to ensure that applicable criteria were adequately established.
4. Two areas of concern regarding the environmental qualification of HVAC duct sealant and flexible connections are detailed in Exhibit 24 of this report.
5. Section I.E.2. of this report details, in part, a possible design omission wherein the applicable specification prohibits the use of huckbolts in certain areas of the plant's HVAC installations,

but definitive boundaries of the areas affected by the restriction have apparently not been developed or provided to user personnel.

6. Exhibit 4 of this report details a situation where observed conditions of radial shrinkage in circumferential butt welds may not have been considered in analyses for stress intensification factors (although not required by Code).
7. Exhibit 5 of this report details what the PCVT considered to be a design omission wherein the specification applicable to supplier's welding of piping contained restrictions regarding "block welding", but the site installation specification did not (restrictions have now been added to the site specification).
8. Items 2, 3, 4 and 5 of Exhibit 16 of this report detail design related anomalies, and item 7 of the same Exhibit related to a design omission (lack of seismic interference criteria on this project).
9. Items 2 and 3 of Exhibit 25 of this report deal with failure to review supplier documentation, and the technical adequacy of the supplier documentation (relates to HVAC fire dampers).
10. Section II.A.4. of this report details, in part, a PCVT concern regarding design information to suppliers regarding the installation of laminoid labels, which is less stringent than that applied for site installations, and which could be attributed to observations made where labels are falling off of equipment.
11. Exhibit 28 of this report details two areas of observation regarding design control adequacy of the EE-580 Program, the second of which is considered by the PCVT to be perhaps the most important design control issue identified during the verification effort.
12. Section III.C., in part, and Exhibit 43 of this report detail PCVT concerns regarding the design adequacy of expansion anchors as it relates to the installation and inspection of the commodity. The PCVT considers this to be perhaps the most important design adequacy issue identified during the verification effort.
13. Section III.D. of this report details, in part, two areas of hardware related observations (different connections at the same structural beam and HVAC ducting which was solidly welded to a thermally movable beam) which, after evaluation of the PCRT response, appear to be in need of further explanation to substantiate their adequacy.
14. Item II. of Exhibit 40 of this report details a PCVT concern with regard to as-built drawings for cadwelds as prescribed by R.G. 1.10.

15. Exhibit 41 of this report details a PCVT concern with regard to deletion of testing requirements from the applicable specification (for non-shrink grout).

B. Procedures

Throughout the course of the Pre-CAT verification, including the planning stages, the PCVT accomplished an ongoing assessment of applicable inspection procedures for their adequacy and comprehensiveness (as related to applicable design/acceptance criteria), plus their "workability" with regard to providing inspection personnel with a concise set of instructions for the performance of verification activities.

Specific procedural observations' locations within the body of this report are to follow. However, the overall conclusion reached by the PCVT is that the procedures, needed to be used by responsible inspection and test personnel, are in some cases incorrect, in most cases lacking with regard to detail, and in almost all cases lacking from a "workability" standpoint.

One task of the PCVT during the planning stages was to extract what were felt to be critical inspection attributes for each commodity from applicable design documents and to record them on the PCVT checklist for later verification. Then, the applicable inspection procedures were "bounced" against the checklists to determine if the attributes were procedurally addressed. Those not procedurally addressed (which were extensive) were "flagged" on the checklists to indicate to the PCVT field reviewers that a possible area of procedural omission existed, and that extra attention should be afforded to each flagged attribute to determine if the perceived omission resulted in an actual inspection omission. With some exceptions, the PCVT observed that ESI QC is satisfactorily covering most attributes regardless of the procedural lack of detail.

Specific PCVT observations will not be reiterated. Rather, the following is a listing of locations within this report where observations are detailed. These observations deal with procedural adequacy, accuracy, and "workability". Based on PCVT observations, it is recommended that the project undertake an effort to make whatever corrections and improvements are deemed necessary in order to arrive at a set of inspection procedures which will positively assist QC in making comprehensive and adequate verifications.

Report locations are as follow:

1. Exhibits 3, 5, 9, 10, 22, 29, 32, 38, 39, 42, 44, 46, 47
2. Section I.B.2. and I.B.2.a.
3. Section I.B.3
4. Section I.C.1.b., c., f., g., i., j.
5. Section II.A.5.
6. Section II.B.

7. Section III.A.
8. Section III.B.
9. Section III.C.
10. Section III.E.
11. Section III.F.

C. Document Control

The PCVT did not accomplish direct reviews of the implementation of the STP document control process. Rather, "indirect" assessments of the process' effectiveness were made throughout the verification effort. Although observations generally indicated that document control activities were adequate (from a "cause/effect" standpoint regarding hardware), there were a number of observations made which indicated deficiency or weakness. These are as follow:

1. Section I.E.1. of this report details, in part, observed weaknesses in the document retrieval ability of FDCC personnel (this was a personnel issue, not a program weakness).
2. Item 1. of Exhibit 17
3. Item I. of Exhibit 21
4. Exhibit 36

VI. Nonconformance Control/Corrective Action

A. Nonconformance Control

The PCVT assessed the adequacy of the nonconformance control process on an indirect basis throughout the course of the verification effort, and also did a direct assessment of selected Nonconformance Reports (NCRs) which were either invalidated or dispositioned "use-as-is" to adjudge the appropriateness of invalidation or the technical adequacy of the justifications provided for use-as-is dispositions. Details of observations are as follow.

1. Field observations

Numerous PCVT observations of hardware deficiencies in the field which affected installation and have already been inspected and accepted by QC, are considered as being indications of failure to identify nonconforming conditions. Specific instances are detailed throughout Sections I, II and III of this report, and will not be reiterated at this point.

Although the above statement could be interpreted as being obvious with no further mention necessary, the project is advised that the adequacy of QC identification of nonconformances is a prime topic of consideration by the NRC during CAT Inspection evaluations of QA program effectiveness, and that similar (although more extensive) conclusions are drawn by that entity based upon the results obtained through in-plant hardware verifications.

A specific issue regarding an NCR related to HVAC fire dampers which warrants project attention is detailed in Exhibit 25 of this report.

Section II.2. of this report details a PCVT concern regarding the practice of attaching hold tags to an entire electrical cabinet rather than the actual components within the cabinet which are nonconforming, and then performing work on the cabinet without the benefit of a conditional release. While the PCVT determined that no deficiency existed, it was recommended that the practice be discontinued and that hold tags be affixed only to the actually affected items so as to preclude questions/criticism by others.

Exhibit 43 of this report details a PCVT concern regarding the technical adequacy of the disposition of a B&R NCR which was rolled over into the current system during transition. It was then dispositioned based on design/acceptance criteria which differs from that used as a baseline under the previous Engineer/Contractor's purview.

2. NCR Technical Evaluations

The PCVT performed a review of approximately 200 Nonconformance Reports which had been invalidated; or, they were dispositioned

"use-as-is" by BEC Engineering. Those invalidated NCRs were reviewed to assess the appropriateness of invalidation. The "use-as-is" NCRs were reviewed to assess the technical justifications provided (as required by procedure) by BEC Engineering. The assessment was intended to verify that "use-as-is" dispositions were supported by an appropriate and technically adequate justification which served to demonstrate that the item(s), although not in accordance with existing requirements, would still acceptably accomplish its designed purpose in the plant without adverse effect on operation/safety.

Of these NCRs reviewed, numerous NCRs were selected which had technical justifications perceived to be potentially incomplete, inappropriate or technically inadequate. Seventeen (17) NCRs were forwarded to HL&P Engineering for review to obtain an evaluation as to their dispositions' completeness (as a "stand alone" document, although reference to other supporting documents is acceptable) and technical adequacy. Of the 17 reviewed, the PCVT and/or Engineering concluded that fourteen (14) of the 17 were lacking in one regard or another.

Details regarding each of the NCRs are as follow:

- a. NCR #HN-00033 - Deficiency identified related to materials' mechanical properties not meeting specified requirements. The NCR was invalidated based on a statement that the ECI Welding department had discerned that the rejectable material had not been used in safety related applications under certain conditions, which could have occurred under either the past or present constructors. This invalidation occurred the day after the NCR was initiated.

The PCVT, with concurrence from HL&P Engineering, feels that this invalidation (by ECI) was inappropriate, and that additional discussion is required regarding the process used to investigate this material's usage. Also, documented results of the investigation are needed in order to substantiate the indication that no problem exists.

- b. NCR #CC-02504 - This NCR deals with the "use-as-is" disposition of concrete which had failed its slump test at the point of acceptance based on an acceptable slump at the point of placement. Although HL&P Engineering agrees that this appears to be an acceptable resolution, the following information is provided, which indicates an apparent "open loop" on the acceptance of this concrete. ESI CSP-4, in 9.03.02.01, requires in part, "When concrete slump tests, taken at the point of acceptance, exceed their specified "rejection limit", additional cylinders for strength tests shall be taken . . . "

There is no documentary evidence to substantiate that these additional tests were taken to support the adequacy of the concrete.

- c. NCR #HC-02549 - This NCR documented an observed concrete crack. This disposition justification stated that structural integrity was not compromised; therefore, accept as is. HL&P Engineering, while concurring with the disposition as it relates to structural integrity, indicated that the crack was below the design water table and that the disposition should have been "repair" so as to prevent leakage of underground water into the building. A subsequent response from BEC Engineering indicates that the crack is a shrinkage crack, and that there is no concern for leakage; therefore, no repair is required.

Two (2) possible scenarios exist, neither of which is considered to be acceptable. The first is that a repair is indeed needed and the original disposition is fully inadequate. The second is that, while there may be no repair needed, the original disposition was lacking in that it failed to consider all of the potential problems (e.g. - leakage, in addition to structural integrity) which could arise as a result of accepting this crack.

- d. NCR #CE-01340 - This NCR documented a condition wherein the brace on a cable tray hanger exceeded the allowable angle of 35 to 55 degrees. The NCR was invalidated, stating that the condition was not a nonconformance.

With HL&P Engineering concurrence, the PCVT feels that, due to the lack of any explanation which should have supported the statement that the condition was not a nonconformance, invalidation of this NCR was inappropriate.

- e. NCR #CE-0830 - This NCR's "use-as-is" disposition was with regard to the use of 3/16" welds rather than 1/4" welds, and it was stated that the actual condition "develops the strength required for this case. Use as is."

Without stating the basis for the statement that the smaller welds would still be acceptable or making reference to an applicable analysis, the PCVT feels that the response is inadequate.

- f. NCR #CE-00807 - Response determined to be acceptable to HL&P Engineering.

- g. NCR #CC-02542 - This NCR documented an instance where clip angles with slotted holes (for support of a fan and its concrete pads, per disposition) were welded in place rather than bolted. The two-part justification for the "use-as-is" disposition was as follows: 1) The . . . connection with slotted holes is a friction type . . . which prevents axial movement . . . as the weld will. 2) (This part was an explanation of anticipated loads to support a statement of structural adequacy.)

The PCVT took issue with each justification as follows: 1) It is not apparent that a slotted connection's purpose is to prevent axial movement. Rather, it would appear that a slotted connection's designed function would be to permit linear movement. 2) Justification of structural adequacy was not an apparent issue. The capability of the welded connection to withstand designed loads has no bearing upon the acceptance of a fixed welded connection in lieu of a movable slotted connection.

Contrary to the BEC justification, HL&P Engineering's assessment was that the slotted holes' purpose was solely to facilitate construction fitup, and that welding was acceptable.

In any event, and whatever the actual purpose of these slotted holes, the BEC justification is considered to be inadequate and/or inappropriate.

- h. NCR #CC-02570 - Invalidation determined to be appropriate.
- i. NCR #CC-01527 - Although the technical justification on an "Attachment 1" revision sheet (pages 1 and 2 of 2) is good, this attachment is not referenced anywhere in the NCR itself, which is two pages in length. Officially, therefore, the attachment does not exist, as it could be removed without traceability, leaving the NCR page 1 disposition to stand alone, which it does not do.
- j. NCR #CC-02135 - Disposition determined to be adequate.
- k. NCR #CC-02206 - This NCR documented cut rebar, and the "use-as-is" disposition was justified by a statement that the Houston office had reviewed the item and had determined that there was no structural effect; therefore, use as is.

In forwarding of this NCR to HL&P Engineering, the PCVT's position was that this review should have been documented or referenced on the NCR.

The HL&P Engineering response was that locations of cut bars are maintained on drawings, and that engineers typically use their judgement; and, that a composite of all cut bars would be evaluated at the time of building turnover, documenting the results of the analysis.

With regard to the use of judgement, the PCVT does not feel that a definitive statement such as is in the NCR disposition (e.g. - " . . . will not keep the wall from withstanding the loads . . . ") can be adequately justified without documented analyses. Also, it appears as if the formal evaluation with regard to cut rebar/structural integrity will not occur until turnover, which seems as if it could be an inopportune time to discover that the cumulative amount of cut rebar was unacceptable.

1. NCRs #CC-02514 and CC-02520 - These NCRs dealt with justification for "use-as-is" dispositions on below minimum temperature curing of grout. Although HL&P Engineering states that both dispositions are acceptable, the PCVT feels that the disposition provided for CC-02514 is inferior to that for CC-02520, both of which cover the same type situation. CC-02520 is dispositioned in much greater detail and clarity, while the CC-02514 disposition contains a degree of implication which can lead to questions with regard to adequacy. This, however, is reported as a concern only.
- m. NCRs #HC-02257 and HC-02144 - The PCVT does not necessarily concur with the HL&P Engineering assessment, and disposition of these two NCRs is considered to be unacceptable. Again, the issue at hand is the use of engineering judgement in determining the acceptability of an item without having any documented data upon which the determination was made. Cognizant organizations should remain aware of the fact that further NCR reviews of this nature will, in all likelihood, occur during the NRC CAT Inspection, and that numerous other projects have been cited for inadequate documented technical justification/use of judgement as a basis for "accept-as-is" dispositions.
- n. NCRs #CH-00480 and CH-00500 - Both of these NCRs documented missed inspection hold points (visual inspection of base material prior to repair). Both NCRs are dispositioned "use-as-is" with justification statements that, "The procedural violation of a missed hold point would not effect the structural integrity . . .", and that final QC acceptance of the weld repair would indicate a quality of repair, meeting the "intent of the drawing." HL&P Engineering concurs with the dispositions, but the PCVT takes exception to them, and considers them to be unacceptable based on the following.

Most importantly, it should be noted that these types of disposition justifications are typical for NCRs issued due to missed hold points. The two NCRs identified herein are only examples. The hold point verification of base metal soundness prior to welding is designed, as much as anything, as a preventative measure to preclude unneeded repair due to welding on unsound material. Also, it cannot be unequivocally stated that an acceptable weld repair (based on visual examination) is an indication that the parent metal is sound.

B. Corrective Action

The PCVT did not accomplish an extensive review of the project's corrective action program, although selected verifications were made. Also, a review of the STP Trend Analysis Program was done.

One of the attributes of the corrective action program assessed by the PCVT was timeliness. This is a feature which regularly receives scrutiny by the NRC during CAT Inspections. It was determined that,

although there exist some instances where the timeliness (of responses, implementation or verification) was lacking, the project generally fares rather well in this regard. It was also observed that the controls in place to ensure corrective action timeliness are good and are closely monitored by QA Management.

The only area observed to be generally lacking with regard to timeliness was that related to supplier corrective action. The PCVT observed that the timeliness of supplier responsiveness was often poor, and that followup and verification activities by the responsible organization (Bechtel Supplier Quality) were less than adequate. The PCVT observed instances where resolution of identified corrective action issues took in excess of a full year. Also, it was observed that supplier corrective action was not being monitored by the project. A response to a recent HL&P SDR (H-037) which identified untimeliness, committed to begin providing data relative to open supplier corrective action issues to Project QA on a monthly basis for inclusion in the QA Monthly Activity Report. This will include this area of activity into the corrective action monitoring process. The PCVT considers these actions to be appropriate.

There were several observations made during the Pre-CAT verification which indicate apparent weakness with regard to the effectiveness of corrective actions being implemented. These deal mostly with repetitive deficiencies, and would appear that the root causes of problems have either not been identified, or that corrective actions which were determined to be needed were either inappropriate or ineffective in correcting the root cause. Examples of some of the conditions observed during the PCVT investigation are as follow.

1. Exhibit 6 details a PCVT concern regarding the repetitive occurrence of arc strike damage to items in the plant.
2. Section I.D. of this report details a PCVT concern regarding repetitive maintenance deficiencies.

A review of the STP Trend Analysis Program (as updated on March 5, 1985) was accomplished. The applicable project procedure for implementing this program is (HL&P) PSQP-16.3, revision 3. Also reviewed were the actual trend reports for the fourth quarter of 1984 and the first quarter of 1985. The following is a summary of observations made during the review.

As an overall observation, the Trend Analysis Program appears to be well structured, and has the capability to provide the project with a lot of good information under a wide range of reporting formats. There were, however, a number of observations made which could be indicative of a program weakness or of an opportunity for making improvement.

As defined in the trending program description, and again in 3.1 of the PSQP-16.3, the conditions addressed by the program for trending consideration are " . . . duplication of a significant condition,

frequent occurrences of a minor condition, or the occurrence of similar conditions which may suggest underlying systematic weaknesses.". The first question which comes to mind when reviewing this regards sub-definitions of words such as "significant", "frequent", "minor" and "similar" as they relate to the context in which they are applied to trending considerations. "Significant" could be construed as applying only to 10CFR50.55(e)-related conditions, although it is not clear if this is the intent for the trending program. "Frequent" appears to be in the process of being qualified by the establishment of control limits which are intended to "trigger" the trend consideration process. "Minor" and "similar", much the same "significant", appear to be rather nebulous at present. Although the issue at hand appears to be strictly semantics, the definition of these terms as they apply to the trending program is important, as these are the key attributes considered when determining as to whether a trend exists. It is recommended that these terms be qualified and/or quantified for trending applicability.

With regard to the previously mentioned control limits which are being established, the PCVT offers the following observations and recommendations. As understood by the PCVT, these control limits are intended to provide "triggering" points for the initiation of trend considerations when the rate of deficiency reaches an established level. Review of these control limits indicates that they are based upon a rate of deficiency per unit of normalization, whatever that may be. For example, the "trigger" point for a given commodity could be a rate of four (4) deficiencies per thousand units of measure (installed). This will provide a definite measurement, much the same as an AQL with control points as per MIL STD 105-D. One attribute which does not appear to be considered in the trending program is the upward trend of frequency when compared to previous reporting periods. For example, the rate of deficiency occurrence in the electrical supports area in the fourth quarter of 1984 was 76.4% higher than that of the third quarter.

The report for the first quarter of 1985 indicated that the rate had again risen to a value which was 890.5% higher than that of the fourth quarter of 1984 (866.5% higher than the overall 1984 average). Although actions to be taken were described in the trend report, the report also stated that issuance of a Trend Investigation Report (TIR) was not warranted at that time. It is recommended that control limits be established to monitor upward trends with regard to percentage of normalized increase in addition to the rate of deficiency per normalizing quantity.

One area where it was not apparent that adequate trending was being accomplished was with regard to "... similar conditions which may suggest underlying systematic weaknesses.". It is presumed that a trending sort to gain this type of information would be by deficiency type, regardless of organization of commodity. This information is available and is being extracted, but it is not apparent that it is being appropriately considered. For example,

review of discipline deficiency distribution data for the fourth quarter report indicates that "damage" is the second highest deficiency type (cause) for each discipline, next to violation of design drawing requirements. With the exception of the civil discipline, these facts are again borne out in the first quarter report. There do not appear to be any considerations in process to follow up, determine the root cause of the problem, and effect appropriate corrective actions. Of a related nature, "improper storage" and "cleanliness" deficiencies account for 88.4% and 96.7% of the total deficiencies under the "General" discipline for the fourth and first quarter reports, respectively, and no investigative actions appear to have been initiated. It should be noted that the PCVT has identified generic deficiencies regarding temporary storage, staging and in-place protection during the verification effort, and has also observed general housekeeping inadequacies throughout the plant which are presently not to be cited on deficiency documents. When considering these on a discipline basis, the numbers would not necessarily indicate a generic problem. However, a "big picture" overview could indicate that these similar conditions may well suggest an underlying systematic weakness. Accordingly, the PCVT recommends that the trending program be modified to consider these types of conditions, and that evaluation criteria/control limits be established to measure for the development of an adverse trend.

An inconsistency in reporting format was observed when comparing the fourth and first quarter trend report executive summaries. In the fourth quarter report, the percent of change in deficiencies was detailed for each commodity. In the first quarter report, however, this did not occur. The only commodity which was specifically reported with percentages of change was structural steel, which experienced a 76% decrease as compared to the third quarter of 1984. (No comparison was made to the fourth quarter, which was 30.9% higher than the third quarter.) With the exception of pipe supports (+.118%), all other commodities were stated to have indicated an increase, but the increase was not quantified. On a quarter-to-quarter comparison, some of these increases were substantial (e.g. - cable tray at +247.5%, piping at +91.9%, electrical supports at +890.5% and HVAC at +74.5%), and the PCVT feels that the actual figures could have provided executive management with a more concise description of conditions. It is recommended that subsequent reports again include the comparative percentages.

Acknowledging that the topic of trending is subjective, the PCVT does not expect a response to any of the items in this summary; rather, it expects that they be considered as constructive criticism and utilized appropriately.

VII. Inspection

An assessment of ESI QC inspection effectiveness was made based on PCVT observations and hardware verifications' results. Based upon this assessment, the PCVT has concluded that there exist a number of areas where the inspection program as it exists, can be improved to increase both the efficiency and effectiveness of inspection activities on STP. Also observed during the Pre-CAT verification were numerous instances where QC activities, be they related to inspection or reporting, were inadequately accomplished.

Inspection related observations will be discussed by separate categories, namely - planning, performance and reporting.

A. Planning

The inspection planning activities to be implemented on STP are as defined in the STP PQAP, section 10.3, revision 3. This section of the PQAP states in part that:

"Inspection planning identifies characteristics, methods, and acceptance criteria . . . Inspection procedures include all required inspection operations defined by . . . specifications . . . drawings, codes and standards. All required procedures, specifications and drawings are made available to the inspector prior to the performance of an inspection . . . This inspection program includes inspection procedures, instructions or checklists which provide for the following:

- Identification of characteristics . . . to be inspected
- A description of the method . . .
- Acceptance and rejection criteria
- Identification of required procedures, drawings and specifications of revisions . . . "

Based upon PCVT observations made during the Pre-CAT verification, it has been concluded that only by the most liberal of interpretations can it be construed that the inspection planning program as it actually exists is satisfying the intent of the PQAP-described program.

Perhaps the most detailed evaluation of the ESI inspection process was performed related to pipe support inspection. The details of this evaluation are as found in sections I.C.1. and I.C.3. of this report and will not be reiterated in this section. The observations made in these report sections can be applied in varying degrees to other commodities reviewed, but perhaps the most complicated commodities with regard to inspection planning are pipe supports, electrical supports and HVAC supports.

Specifically related to the previously listed PQAP items, the PCVT offers the following observations.

The PCVT concurs that inspection planning identifies characteristics, methods and acceptance criteria (although Pre-CAT observations indicated that all applicable characteristics and acceptance criteria were not always identified for verification). The problem as perceived by the PCVT, discounting all other observations with regard to the complicated nature of the planning needed, deals with the personnel who have been assigned responsibility for accomplishing the planning - QC personnel who will perform inspections.

The PCVT considers ESI to be deficient in this regard in that QC inspection personnel are being expected to perform activities beyond the scope of duties to which their level of education, experience and corresponding certification are applicable (pertains to ANSI N45.2.6 Level II personnel).

The specific required capabilities for Level II inspection, examination and test personnel as defined by ANSI N45.2.6 do not include any provisions regarding experience, training, capability or demonstrated proficiency in inspection planning activities. The only ANSI N45.2.6 certification level with capability to perform inspection planning being a requisite is Level III.

Accordingly, the PCVT contends that inspection planning activities should be assigned to either Level III QC or Quality Engineering personnel, but not the Level II inspectors.

Another feature of the inspection program as required by section 10.3 of the STP PQAP is that, "Inspection activities are to be kept current" This is not occurring, as evidenced by significant backlogs of uninspected items versus construction completed (as reported) items. Review of recent issues of a QC Program Plan which is generated by Ebasco indicates that there has not been much improvement in working off this backlog. Aside from the scheduler problem, this could have a detrimental effect upon the inspectability of items when inspections are accomplished (due to possible inaccessibility to the items as a result of other construction activities and installations in the immediate vicinity).

In summary, the PCVT recommends that inspection planning responsibilities be assigned to appropriate individuals, that inspection procedures be corrected and improved (refer to section V.B. of this report for details) in order to arrive at a set of adequate and workable instructions to inspection personnel, and that an effort be undertaken for each commodity to identify critical inspection attributes which need to be covered during QC verification activities. Also, it is recommended that the depletion of the existing backlog of items to be inspected be afforded a high degree of priority by whatever means are appropriate. It is anticipated that reassignment of planning responsibilities and simplification/clarification of the planning process will automatically take much of the workload from QC, enabling them to accomplish a lot more actual inspection activities.

B. Performance

Many of the deficient attributes observed by the PCVT during in-plant verifications are indicative of instances where the inspector failed to identify problems in the installation which cannot be attributed to unclear or complicated criteria and which must be extracted from applicable documents. These instances must be attributed solely to personnel error or oversight.

An item worthy of repeating relates to PCVT observations with regard to QC performance as discussed in section V.B. of this report. In this regard, the PCVT observed that, although the procedures to which an inspector must work are generally lacking with regard to instructions for accomplishing the inspection and applicable attributes, ESI QC is satisfactorily covering most of the attributes which need to be checked.

C. Reporting

Discussion regarding inspection reporting will be broken down into three separate categories: timeliness, specificity and adequacy.

1. Timeliness

Also included in the previously discussed QC Program Plan is a representation of installation (QA) records in HL&P custody versus the discussed inspection versus construction complete data. The backlog of records to be processed is perhaps even more significant (will be discussed further in the Records summary) than the to-be-inspected backlog and can be partially attributed to an observed lack of timeliness in QC completion and submittal of records for a completed, accepted installation.

As required by QCP-17.1, the responsible QC supervisor is responsible for the review and validation of records prepared by QC inspectors under his cognizance prior to forwarding the records for further processing and ultimate retention in the STP-RMS vault. The PCVT has observed instances where this required supervisory review and signoff has taken as long as a full year to be accomplished after the inspector had signed the report (refer to section I.E.1. for details). The PCVT has also reviewed documentation indicating a backlog of records packages (defined as two or more records pertaining to an installation) numbering in the thousands for electrical supports and weld data packages which need to be reviewed and validated by QC. This documentation also indicated that no notable progress was being made with regard to depletion of this backlog.

The PCVT has no reason to believe that similar backlogs do not exist for other commodities, and strongly recommends that appropriate actions be taken to eliminate this backlog as soon as possible so that required records can be processed into the vault in support of established schedules.

2. Specificity

The PCVT has observed numerous instances where QC verification of specific attributes, which are considered to be critical to the acceptability of an item or installation, are not being identified/reported on the applicable inspection report. Inspection reports were, much as their corresponding inspection procedures, very general and did not address specific attributes to be inspected. The following is a listing of some observations made in this report with regard to lack of reporting specificity:

- a) Section I.C.1.j.
- b) Section I.E.1./Exhibit 22
- c) Exhibit 38
- d) Section III.D.
- e) Exhibit 42
- f) Exhibit 44
- g) Exhibit 46
- h) Exhibit 47

The PCVT feels that the observed lack of specificity in inspection reporting could cause difficulty in providing substantiating evidence that certain attributes of an item or installation actually received the required verification in the event that such evidence were to be needed at some later date.

3. Adequacy

PCVT review of inspection records for various commodities indicated that the documentation of inspection activities, and the supervisory review of the documentation (required by QCP-17.1 and intended to serve as validation of the record) are, in many instances, being inadequately accomplished.

Specific details of observations made are as found in the Records Summary portion of this report, section VII.B.

VIII. Records

A. Retrievability

Throughout the course of the Pre-CAT verification effort, a listing was maintained of the type and quantity of records requested (all requests were made through HL&P RMS), along with tabulation of the quantity of those records which were in the possession of HL&P RMS in the form of completely processed records. Although all records requested were for completed, accepted installations or self-closing documents which were known to be closed, the results of the tabulation maintained indicated that only approximately forty-four percent (44%) of the documents tabulated had been turned over to HL&P. A breakdown of those documents tabulated is as follows.

| <u>Document Type</u> | <u>*R</u> | <u>*H</u> | <u>Percent</u> |
|-----------------------|-----------|-----------|----------------|
| ESI DN | 5 | 0 | 0 |
| EE-580 cards | 99 | 56 | 57 |
| Electrical travelers | 74 | 25 | 34 |
| Weld data cards | 50 | 28 | 56 |
| RT film | 32 | 13 | 41 |
| PT material certs. | 2 | 0 | 0 |
| CMTRs | 4 | 2 | 50 |
| Welder qualifications | 17 | 0 | 0 |
| Total | 283 | 124 | 44 |

(*) - R = Requested, H = in HL&P possession

Other observed instances of required records not being in their proper locations dealt with individual records which were to be part of a record package (defined as two or more records which serve to support an installation or activity) such as NDE personnel eye examination records (discussed in Exhibit 12) and NDE records (discussed in Exhibit 7).

The location of requested records notwithstanding, the PCVT observed that, with perhaps one exception, HL&P RMS personnel were able to produce all records requested in a timely manner and retrievability was judged to be good. However, the exercises required in order to obtain the requested records (which in one instance consisted of retrieval of the needed document from a gang box in the field) were determined to be representative of a problem which should be afforded a very high degree of priority by the project.

The process through which a record must flow (the PCVT considers a document to become an authenticated QA record (installation record) at the time of the QC supervisor's (or designee) signature validating the adequacy and completeness as prescribed by QCP-17.1) before coming to its final resting place in the STP RMS vault is rather extensive, and includes numerous reviews and handling steps. Most of these are accomplished by the Site Integrated Records Group (SIRG) whose functions are prescribed in Ebasco QAI-019, revision 2.

Through PCVT observations and discussions with various individuals during the course of the evaluation, it became apparent that there exists a rather enormous backlog of records to be processed at nearly all stages of the process. Discussions with HL&P RMS personnel indicate that, of the total number of records packages expected to be necessary to support STP Unit 1 (currently reported to be "construction complete" in excess of eighty percent (80%)), only approximately two and a half percent (2 1/2%) are in HL&P possession.

Provided that HL&P RMS repeats the retrievability effort as displayed during the Pre-CAT verification, the existence of these backlogs should not have much of an adverse effect on the NRC CAT inspection's assessment of records retrievability. However, it is assured that they will not speak very highly of the project's records status. The existing backlogs, if not deleted within the next year, will in all probability have a significant effect on the project's current completion schedule.

Related to the existence of these backlogs and the fact that great quantities of records were classified as being "in process" by the PCRT during the Pre-CAT verification, the PCVT offers the following observation.

Numerous records reviewed by the PCVT were determined to be inadequate for one reason or another, as will be discussed. The prevailing PCRT reaction to many of the PCVT identifications of deficiency was (when applicable) that the records had not yet been turned over to HL&P, were still "in process" and were therefore not to be considered as being records yet. As per the definitions as provided in 4.2 to Attachment 3.2 of QAI-019, revision 2, a Quality Assurance Record becomes a record when the affected document "... has been completed, dated, signed or otherwise authenticated." The definitions of "Completed records" and "In process records" as provided will not be considered during reviews for records adequacy by the NRC CAT Team (nor were they by the PCVT). The validation of records from either a technical or completeness standpoint is not within the stated purpose of the SIRG activities (as per 1.1 of the previously referenced QAI Attachment, SIRG activities are for the purpose of processing quality records that require an administrative and content verification review, not a technical or content validation). Based on this, any inadequacies observed on records which had passed the point of QC validation were considered to be QA record deficiencies by the PCVT, and will be considered in the same manner by the NRC CAT.

B. Adequacy

The adequacy of records reviewed was assessed throughout the course of the verification. As a result of these assessments, the PCVT has concluded that the records being validated for technical adequacy and completeness by QC, and in many cases being passed through the content verification review by SIRG and into the STP RMS records vault are, in many instances, inadequate.

All of the inadequacies, be they technical or completeness related, are indicative of inadequate ESI QC supervision review and validation. Those administrative/content deficiencies identified which affected QA records and which had completed SIRG processing are indicative of SIRG failure to identify those types of attributes which are within the scope of their review criteria. It should be noted that the PCVT (nor HL&P RMS) did not keep track of the specific status of each record reviewed as it related to the SIRG process. However, that information can be discerned.

Based upon the definitions of technical versus content verification reviews as follow (and as prescribed in QAI-019, revision 2, 4.0), the PCVT has attempted to segregate the records deficiencies identified by what it considers to be technical and completeness/administrative inadequacies. The definitions as found in the QAI are as follow:

- "4.1 Technical review - Verification that installation and material parameters are in accordance with the requirements . . ."
- "4.2 Content verification review - Verification that required records are available, attributes required . . . are addressed and required results are recorded."

Therefore, the PCVT segregation criteria was as follows. If the required information was displayed but was not accurate with regard to design parameters or observed as-built conditions, the record is technically inadequate. If the required information is missing or if reporting methodologies (e.g. - line-through and initial/date of corrections) were violated, the record is inadequate in an administrative or content related manner.

Review of records-related observations throughout this report resulted in a determination that none of the deficiencies observed can, at this time, be unequivocally categorized as being representative of a technical inadequacy (although presumed further investigation by the project could change this).

C. SIRG

A review of the ECI and BEC SIRG charters and activities was made, and involved the identification of numerous comments with regard to the procedure which describe SIRG activities, namely - QAI-019, revision 2, and WPP/QCI-6.0, revision 9 (with NPCs 24 and 25). Comments are as follow.

1. QAI-019

This procedure consists of an Ebasco procedure plus Attachment 3.2, which are the Standard Site Requirements (SSP) for SIRG as endorsed by HL&P, BEC and ESI/ECI. Review of QAI-019 resulted in a determination that the procedure is lacking in several regards, that QA program requirements are in violation, and that the overall accountability of SIRG for activities performed is generally limited. Details of observations made which resulted in this determination are as follow.

- a. Paragraph 6.2.2 of the SSR states that, "QAI-019 . . . WPP/QCI-6.0 define those specific records and/or general categories of records that require review by SIRG."

Contrary to this, QAI-019 does not define those specific records or general categories of records which require review. Paragraph 7.1 states that, "designated records" will be reviewed. However, nowhere in the procedure are any records designated for review. It should be noted that Attachment 3.3 to the procedure (Document Turnover Index) does not serve this purpose. All it does is list the types of documents which will be turned over, and it does not discuss SIRG review.

- b. The Content Review Group (CRG) responsibilities as defined in paragraph 6.5.2 of the SSR are to, "Review and accept records/packages in accordance with WPP/QCI-6.0 and QAI-019 as applicable."

Ebasco SIRG review activities are as defined in section 7.0. In that section, specific exception is taken to any technical review responsibilities. With regard to the content verification review which is to be performed, this section states that the review criteria utilized, " . . . are identified in Desk Top Guides" which "provide review guidance . . . " and which are " . . . guides only and are not to be all inclusive or exclusive of . . . requirements." Further stated is that, "Checklists will not be maintained of attributes reviewed." Later in this section, it is stated that, "Hand annotations may be made on Desk Top Guides as an interim update prior to reissue . . ."

The above paraphrased procedural statements eliminate virtually all elements of guidance, accountability and traceability to review criteria/attributes from the SIRG function. The PCVT does not consider this to be appropriate or acceptable.

- c. Paragraph 8.1 of QAI-019 states in part that, "All discrepancies or deficiencies found . . . shall be called to the attention of the originator for correction. Notification may be made by issuance of a Document Deficiency Memorandum (DDM) . . ."

These activities, as described, are in clear violation of the STP QA program with regard to the established corrective action program. Any deficiencies identified with records which have been validated by QC (or any other designated validator for that matter) must be documented and processed in accordance with applicable QA program-endorsed corrective action procedures. These, as prescribed in this procedure, will not be. There is no requirement to document the deficiency at all (procedure states that DDMs "may" be used); and even if DDMs are used, they are not a recognized element of the

STP corrective action program. Therefore, they do not receive consideration for corrective action needs in accordance with the STP Trend Analysis Program.

- d. Paragraph 8.3 states in part that, "The records shall be rereviewed by a supervisor (or his designee) . . ."

It is not clear as to whom this supervisor is intended to be or represent.

- e. Section 13.0 of the procedure addresses record review activities related to ASME Code items, and states in part that, "Prior to Ebasco's certifying the Code Data Report, the SQR Supervisor shall perform final review . . . and sign the System/Subsystem Release . . . Upon review acceptance . . . Ebasco shall certify the Code Data Report . . ."

"Following QC walkdown . . . and prior to N-5 preparation, the . . . drawings . . . and bills of materials shall be verified to assure the as-built condition . . . is accurately reflected."

It would appear that the only way these reviews and verifications could be adequately accomplished would be by the performance of a technical and completeness review combined. (Note that the procedure specifically states that technical reviews shall not be done.)

- f. Section 14.0 of the procedure addresses record review activities related to release for testing and states in part that, "For those systems or components requiring . . . testing, CRG . . . shall review the documentation within the boundaries . . . prior to testing."

"When it is determined through documentation review that no potential hardware affecting discrepancies exist, the SQR Supervisor . . . shall sign the SQR Release Form."

As with item e. above, it would appear that this determination would have to be by technical and completeness review combined.

2. WPP/QCI-6.0

Most of the comments made which apply to QAI-019 are also applicable to this procedure and will not be reiterated. One other comment which applies to this procedure is as follows.

- a. Bechtel SIRG is only responsible to perform a sample review of Ebasco SIRG records. Paragraph 6.4 delineates the methodologies for sample selection, and states that, "The sample . . . shall be determined by the . . . Supervisor. The sample size shall be based upon the current rejection rate developed from the random selected records reviewed (by Bechtel QC). The sample size may be increased or decreased . . ."

This, as prescribed, does not provide any baseline for sample size selection. The procedure does not provide any type of a denominator to be used for the sample size determination based on the current rejection rate.