COMANCHE PEAK STEAM ELECTRIC STATION

UNIT 1 and COMMON

CORRECTIVE ACTION PROGRAM

PROJECT STATUS REPORT

MECHANICAL

TU ELECTRIC

Generating Division

Revision 0

TU ELECTRIC
COMANCHE PEAK STEAM ELECTRIC STATION
UNIT 1 AND COMMON

STONE & WEBSTER ENGINEERING CORPORATION

PROJECT STATUS REPORT

MECHANICAL

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EXECUTIVE SUMMARY

This Project Status Report (PSR) summarizes the systematic validation process implemented by Stone & Webster Engineering Corporation (SWEC) for safety-related mechanical systems and radiological/safety analyses at Comanche Peak Steam Electric Station (CPSES) Unit 1 and Common[1]. This Project Status Report (PSR) presents the results of the design validation and describes the Post Construction Hardware Validation Program (PCHVP). SWEC's activities were governed by the TU Electric Corrective Action Program (CAP) which required SWEC to:

1. Establish a consistent set of CPSES safety-related mechanical system and radiological/safety analyses design criteria that comply with the CPSES licensing commitments.

2. Produce a set of design control procedures that assures compliance with the design criteria.

3. Evaluate safety-related mechanical systems and radiological/safety analyses and direct the corrective actions recommended by the Comanche Peak Response Team (CPRT) and those determined by Corrective Action Program (CAP) investigations to be necessary to demonstrate that safety-related mechanical systems and radiological/safety analyses are in conformance with the design criteria.

4. Assure that the validation resolves the safety-related mechanical systems and radiological/safety analyses related design issues identified by the Comanche Peak Response Team (CPRT), external sources[2], and the Corrective Action Program (CAP).

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[1]Common refers to areas in CPSES that contain both Unit 1 and Unit 2 systems, structures, and components.

[2]External sources include:

- NRC Staff Special Review Team (SRT-NRC)
- NRC Staff Special Inspection Team (SIT)
- NRC Staff Construction Appraisal Team (CAT)
- Citizens Association for Sound Energy (CASE)
- Atomic Safety and Licensing Board (ASLB)
- NRC Region IV Inspection Reports
- NRC Staff Technical Review Team (TRT) [SSERs 7-11]
- CYGNA Independent Assessment Program (IAP)

Comanche Peak Response Team (CPRT) issues are identified by the following:

- Design Adequacy Program (DAP)
- Quality of Construction Program (QOC)

5. Validate that the safety-related mechanical systems and radiological/safety analyses are in conformance with the licensing commitments and that the installed hardware is in conformance with the validated design.

6. Produce a set of consistent and validated design documentation.

The above objectives are applicable to the Ebasco Services Incorporated-Systems Interaction Program (Ebasco-SIP) and the Impell Corporation-Fire Protection Program (Impell-FP). The Project Status Reports (PSRs) for these programs are issued herein as Supplements A and B, respectively.

A consistent set of design criteria for CPSES Unit 1 and Common safety-related mechanical systems and radiological/safety analyses has been developed and used by SWEC for the design validation process. This set of design criteria is in conformance with CPSES licensing commitments. It has been independently and extensively overviewed by the Comanche Peak Response Team (CPRT). CYGNA Energy Services (CYGNA) independently reviewed the design criteria and their implementation for a representative safety-related mechanical system.

SWEC established design control procedures to govern the work flow and technical interfaces with other disciplines for both the design and hardware validation processes. These procedures specify the processes (such as the validation of design inputs, documentation control, and final reconciliation) that have been implemented throughout the mechanical portion of the Corrective Action Program (CAP).

SWEC has performed analyses and reviewed design documentation to validate the design of CPSES Unit 1 and Common safety-related mechanical systems and radiological/safety analyses. The as-built conditions for safety-related mechanical systems are being validated to the design by the Post Construction Hardware Validation Program (PCHVP).

The Post Construction Hardware Validation Program (PCHVP) assures that the safety-related mechanical systems are installed in conformance with the validated design. SWEC has reviewed, revised and validated the CPSES mechanical installation specifications and reviewed the revised construction procedures and Quality Control (QC) inspection procedures for consistency with the validated design and hardware requirements of the Corrective Action Program (CAP). The Post Construction Hardware Validation Program (PCHVP) for safety-related mechanical systems including inspections, engineering walkdowns and evaluations, implements the corrective actions recommended by the Comanche Peak Response Team (CPRT), as well as those required by Corrective Action Program (CAP) investigations.

SWEC will provide TU Electric a complete set of validated design documentation for CPSES safety-related mechanical systems and radiological/safety analyses, including calculations, drawings, specifications and design changes. This documentation can provide the basis for CPSES configuration control[3] to facilitate maintenance and operation throughout the life of the plant.

In-depth quality and technical audits have been performed by SWEC Quality Assurance (QA), the TU Electric Quality Assurance (QA) Program, and the independent Engineering Functional Evaluations (EFE). These audits assure that SWEC procedures, design criteria and design comply with the licensing commitments. The SWEC Quality Assurance (QA) audits verify that the implementation of the validation program is in conformance with the applicable 10CFR50 Appendix B requirements.

The Unit 1 and Common mechanical portion of Corrective Action Program (CAP) validates that:

- The design of safety-related mechanical systems and the radiological/safety analyses comply with the CPSES licensing commitments.
- The as-built conditions of safety-related mechanical systems and components comply with the validated design.
- The safety-related mechanical systems and components comply with the CPSES licensing commitments and will perform their safety-related functions.

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[3]Configuration control is a system to assure that the design and hardware remain in compliance with the licensing commitments throughout the life of the plant.

ABBREVIATIONS AND ACRONYMS

ANI	Authorized Nuclear Inspector
ANSI	American National Standards Institute
ASLB	Atomic Safety and Licensing Board
ASME	American Society of Mechanical Engineers
BOP	Balance of Plant
CAP	Corrective Action Program
CAR	Corrective Action Request
CASE	Citizens Association for Sound Energy
CAT	Construction Appraisal Team (NRC)
CFR	Code of Federal Regulations
CCW	Component Cooling Water
CMTR	Certified Material Test Report
CPE	Comanche Peak Engineering (TU Electric)
CPRT	Comanche Peak Response Team (TU Electric)
CPSES	Comanche Peak Steam Electric Station
CST	Condensate Storage Tank
CYGNA	CYGNA Energy Services
DAP	Design Adequacy Program (CPRT)
DBCP	Design Basis Consolidation Program
DBD	Design Basis Document
DBT	Design Basis Tornado
DG	Diesel Generator
DIR	Discrepancy Issue Report (CPRT)
DR	Deficiency Report
DVP	Design Validation Package
EA	Engineering Assurance (SWEC)
EAB	Exclusion Area Boundary
Ebasco	Ebasco Services Incorporated
EFE	Engineering Functional Evaluation
FP	Fire Protection
FSAR	Final Safety Analysis Report
FVM	Field Verification Method
GIR	Generic Issue Reports
HVAC	Heating, Ventilating, and Air Conditioning
I&C	Instrumentation and Controls
IAP	Independent Assessment Program (CYGNA)
IE	Inspection and Enforcement (NRC)
Impell	Impell Corporation
IRR	Issue Resolution Report (CPRT)
ISAP	Issue Specific Action Plan (CPRT)
JTG	Joint Test Group
LOCA	Loss of Coolant Accident
LPZ	Low Population Zone
MSLB	Main Steam Line Break
NCR	Nonconformance Report

NDE	Nondestructive Examination
NRC	United States Nuclear Regulatory Commission
NSSS	Nuclear Steam Supply System
NUREG	NRC Document
OSP	Office of Special Projects (NRC)
PCHVP	Post Construction Hardware Validation Program
PSR	Project Status Report
PWR	Pressurized Water Reactor
QA	Quality Assurance
QAAD	Quality Assurance Auditing Division (SWEC)
QC	Quality Control
QI	Quality Instruction
QOC	Quality of Construction and QA/QC Adequacy Program (CPRT)
RCP	Reactor Coolant Pump
RHR	Residual Heat Removal
RIL	Review Issue List (CYGNA)
SDAR	Significant Deficiency Analysis Report (TU Electric)
SER	Safety Evaluation Report (NRC, NUREG-0797)
SIP	Systems Interaction Program
SIT	Special Inspection Team (NRC)
SRT	Senior Review Team (CPRT)
SRT-NRC	Special Review Team (NRC)
SSER	Supplemental Safety Evaluation Report (NRC, NUREG-0797)
SWEC	Stone & Webster Engineering Corporation
SWEC-PSAS	Stone & Webster Engineering Corporation - Pipe Stress and Support Project
SWSQAP	Stone & Webster Standard Quality Assurance Program
TAP	Technical Audit Program (TU Electric)
TDI	Transamerica Delaval, Inc.
TDR	Test Deficiency Report
TERA	Tenera, L. P.
TRT	Technical Review Team (NRC)
UT	Ultrasonic Testing

1.0 INTRODUCTION

In October 1984, TU Electric established the Comanche Peak Response Team (CPRT) to evaluate issues that have been raised at CPSES and to prepare a plan for resolving those issues. The Comanche Peak Response Team (CPRT) program plan was developed and submitted to the NRC.

In mid-1986, TU Electric performed a qualitative and quantitative review of the preliminary results of the Comanche Peak Response Team (CPRT). This review identified that the Comanche Peak Response Team (CPRT) issues were broad in scope and included each discipline. TU Electric decided that the appropriate method to correct the issues raised and to identify and correct any other issues that potentially existed at CPSES would be through one integrated program rather than a separate program for each issue. TU Electric decided to initiate a comprehensive Corrective Action Program (CAP) (References 1,2 and 3) to validate CPSES safety-related designs.[1,2] The Corrective Action Program (CAP) has the following objectives:

- Demonstrate that the design of safety-related systems, structures and components complies with licensing commitments.
- Demonstrate that the existing systems, structures and components are in compliance with the design; or develop modifications which will bring systems, structures, and components into compliance with design.
- Develop procedures, an organizational plan, and documentation to maintain compliance with licensing commitments throughout the life of CPSES.

The Corrective Action Program (CAP) is thus a comprehensive program to validate both the design and the hardware at CPSES, including resolution of specific Comanche Peak Response Team (CPRT) and external issues.

TU Electric contracted and provided overall management to Stone & Webster Engineering Corporation (SWEC), Ebasco Services Incorporated (Ebasco) and Impell Corporation (Impell) to implement the Corrective Action Program (CAP) and divided the CAP into eleven disciplines as follows:

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[1]Nuclear Steam Supply System (NSSS) design and vendor hardware design and their respective QA/QC programs are reviewed by the NRC independently of CPSES as noted in SSER 13 and are not included in the Corrective Action Program (CAP); however, the design interface is validated by the CAP.

[2]Portions of selected non-safety-related systems, structures, and components are included in the Corrective Action Program (CAP). These are Seismic Category II (Section 3.2, Reference 38) systems, structures and components, and fire protection systems.

DISCIPLINE	RESPONSIBLE CONTRACTOR
Mechanical	SWEC
- Systems Interaction	Ebasco
- Fire Protection	Impell
Civil/Structural	SWEC
Electrical	SWEC
Instrumentation & Control	SWEC
Large Bore Piping and Pipe Supports	SWEC-PSAS
Cable Tray and Cable Tray Hangers	Ebasco/Impell
Conduit Supports Trains A,B, & C >2"	Ebasco
Conduit Supports Train C $\leq$2"	Impell
Small Bore Piping and Pipe Supports	SWEC-PSAS
Heating, Ventilation, and Air Conditioning (HVAC)	Ebasco
Equipment Qualification	Impell

A Design Basis Consoliuation Program (DBCP) Plan (Reference 4) was developed to define the methodology by which SWEC performed the design and hardware validation. The approach of this Design Basis Consolidation Program (DBCP) is consistent with other contractors' efforts and products.

The design validation portion of the Corrective Action Program (CAP) identified the design-related licensing commitments. The design criteria were established from the licensing commitments and consolidated in the Design Basis Documents (DBDs). The DBDs identify the design criteria for the design validation effort. If the existing design did not satisfy the design criteria, it was modified to satisfy the design criteria. The design validation efforts for each of the eleven Corrective Action Program (CAP) disciplines are documented in Design Validation Packages (DVPs). The Design Validation Packages (DVPs) provide documented assurance (e.g., calculations and drawings) that the validated design meets licensing commitments, including resolution of all related Comanche Peak Response Team (CPRT) and external issues.

The design validation effort revised the mechanical installation specifications to reflect the validated design requirements. The validated installation specifications also contain the inspection requirements necessary to assure that the as-built hardware complies with the validated design.

The hardware validation portion of the Corrective Action Program (CAP) is being implemented by the Post Construction Hardware Validation Program (PCHVP) which demonstrates that existing safety-related systems, structures and components are in compliance with the mechanical installation specifications and design drawings (validated design), including the modification that is necessary to bring the hardware into compliance with the validated design.

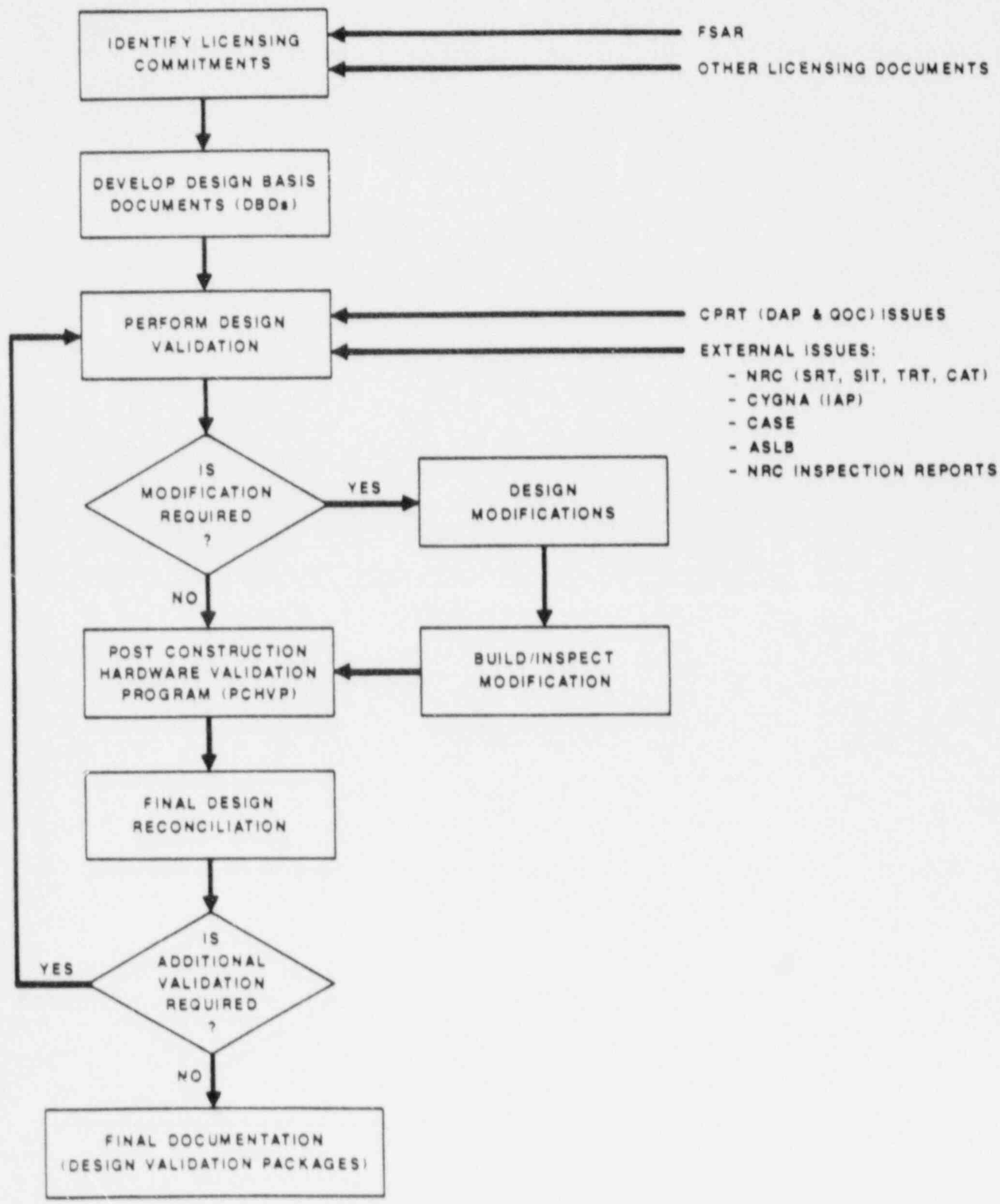
The results of the performance of the Corrective Action Program (CAP) for each discipline are described in a Project Status Report (PSR). This Project Status Report (PSR) describes the results for the mechanical portion of the Corrective Action Program (CAP).

SWEC has performed a comprehensive validation of safety-related mechanical systems and radiological/safety analyses for CPSES Unit 1 and Common in order to demonstrate that the design of safety-related mechanical systems and radiological/safety analyses complies with licensing commitments. SWEC is performing the Post Construction Hardware Validation Program (PCHVP) to demonstrate that the as-built safety-related mechanical systems and components comply with the validated design. The validation process is conducted in accordance with the Design Basis Consolidation Program (DBCP) which controls implementation of the mechanical portion of the TU Electric Corrective Action Program (CAP), shown schematically in Figure 1-1. The safety-related mechanical systems and the radiological/safety analyses design bases are contained within a consolidated set of CPSES Design Basis Documents (DBDs).

The methodology used in implementing both the design and hardware-related validations for CPSES Unit 1 and Common safety-related mechanical systems and radiological/safety analyses and the results of the validation effort are presented in this Project Status Report (PSR).

This mechanical Project Status Report (PSR) describes the validation effort from the early stages of design criteria development through the implementation of the Post Construction Hardware Validation Program (PCHVP). This report addresses the updating of the installation specifications, construction procedures and Quality Control (QC) inspection procedures, the development of the Post Construction Hardware Validation Program (PCHVP) used to validate the as-built safety-related mechanical systems and components to the validated design, and the completion of the CPSES Unit 1 and Common Design Validation Packages (DVPs).

FIGURE 1-1
CORRECTIVE ACTION PROGRAM (CAP)
MECHANICAL



2.0 PURPOSE

The purpose of this Project Status Report (PSR) is to demonstrate that the safety-related mechanical systems and radiological/safety analyses of CPSES Unit 1 and Common are in conformance with the CPSES licensing commitments, satisfy the design criteria, and that the mechanical systems will satisfactorily perform their safety-related functions.

3.0 SCOPE

The scope of the mechanical portion of the Corrective Action Program (CAP) implemented for CPSES Unit 1 and Common included all safety-related mechanical systems and radiological/safety analyses.

The validation included the following mechanical systems:

- Containment Spray
- Auxiliary Feedwater
- Component Cooling Water
- Service Water
- Reactor Vessel Head Vent
- Containment Isolation
- Combustible Gas Control
- Radiation Monitoring
- Emergency Diesel Generator
- Diesel Generator Fuel Oil
- Main Steam/Steam Dump[1]
- Feedwater[1]
- Fuel Pool Cooling and Purification[1]
- Demineralized/Reactor Water Makeup[1]
- Primary Sampling[1]
- Compressed Air/Instrument Air[1]
- Vents and Drains[1]
- Reactor Coolant[2]
- Safety Injection[2]
- Chemical and Volume Control[2]
- Residual Heat Removal[2]
- Boron Recycle[2]
- Liquid Waste[2]
- Gaseous Waste[2]

The validation further included the following radiological/safety analyses:

- Equipment Radiation Dose Analyses
- Radiation Source Term Analyses
- Radiological Accident Analyses
- Subcompartment Pressurization Analyses
- Containment LOCA and MSLB Analyses
- Containment Fission Product Removal Analyses
- Control Room Habitability Analyses

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[1] Portions of this system are non-safety related. The mechanical portion of the Corrective Action Program (CAP) validated the safety-related portions of this system.

[2] This is an NSSS-designed system. SWEC has validated the design interface and is validating the as-built configuration of this system as part of the Post Construction Hardware Validation Program (PCHVP).

The mechanical[3] portion of the CPSES Corrective Action Program (CAP) is shown schematically in Figure 1-1 and discussed below. The program required:

1. Establishment of mechanical design criteria which comply with licensing commitments.

2. Development of the mechanical Design Basis Documents (DBDs), which contain the design criteria.

3. Implementation of design and hardware validations, consisting of analysis, identification and implementation of necessary modifications, and field verifications as identified in the Post-Construction Hardware Validation Program (PCHVP). The mechanical hardware as-built configuration is validated to the mechanical design by Quality Control (QC) inspections, engineering walkdowns, and engineering evaluations.

4. Resolution of the design and hardware-related CPSES mechanical issues and implementation of Corrective Action Program (CAP) for closure of these issues. These issues include external issues, Comanche Peak Response Team (CPRT) issues, and issues identified during the performance of the Corrective Action Program (CAP) (see Section 4.0).

5. Development of validated design documentation to form the basis for CPSES mechanical configuration control. The validated design documentation (calculations, design drawings, and specifications) and Design Basis Documents (DBDs) can be utilized by TU Electric to facilitate operation, maintenance, and future modifications following issuance of an operating license.

Section 5.1 of this mechanical Project Status Report (PSR) describes the methodology and work performed in the mechanical portion of the Corrective Action Program (CAP).

Section 5.1.1 describes the methodology by which CPSES licensing commitments were identified, the design criteria were established, and the Design Basis Documents (DBDs) were developed.

Section 5.1.2 describes the design validation process including the basis of validating the parameters for such items as calculation reviews and interface requirements with other disciplines. The subsection also describes interfaces among participants in the Corrective Action Program (CAP) and the final reconciliation process.

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[3] Hereinafter, the safety-related mechanical systems and radiological/safety analyses are referred to as mechanical.

Section 5.1.3 describes the Post Construction Hardware Validation Program (PCHVP) process and the procedures for field validations (Quality Control (QC) inspections, engineering walkdowns, and engineering evaluations) required to be implemented to validate that the as-built mechanical systems and components are in compliance with the design documentation.

Section 5.2 presents a summary of the design validation results and the Post Construction Hardware Validation Program (PCHVP) results, including the hardware modifications resulting from the mechanical portion of the Corrective Action Program (CAP).

Section 5.3 describes the Quality Assurance (QA) Program implemented for the validation process, including SWEC Engineering Assurance (EA) audits, the Engineering Functional Evaluation (EFE) audits, and the TU Electric Quality Assurance (QA) audits.

Section 5.4 describes SWEC mechanical inputs to the TU Electric preventive actions, including the transfer of a complete set of validated design documentation and procedures to Comanche Peak Engineering (CPE). This set of documentation and procedures can provide the basis for CPSES configuration control throughout the life of the plant.

Appendix A of this Project Status Report (PSR) describes the details of the Corrective Action Program (CAP) resolutions of the mechanical systems-related Comanche Peak Response Team (CPRT) and external issues.

Appendix B of this Project Status Report (PSR) describes the details of resolutions of issues identified during the mechanical portion of the Corrective Action Program (CAP). These are issues that have been determined to be reportable under the provisions of 10CFR50.55(e). These issues are identified in Significant Deficiency Analysis Reports (SDARs) initiated by TU Electric.

Supplement A to this Project Status Report (PSR) presents Ebasco's Systems Interaction Program (SIP) Project Status Report (PSR).

Supplement B to this Project Status Report (PSR) presents Impell's Fire Protection Project Status Report (PSR).

4.0 SPECIFIC ISSUES

The mechanical portion of the Corrective Action Program (CAP) resolved all related Comanche Peak Response Team (CPRT) issues, external issues, and issues identified during the performance of the CAP. This section presents a listing of mechanical related issues addressed in this Project Status Report (PSR). Technical review, resolution, and corrective and preventive actions of all external and Comanche Peak Response Team (CPRT) issues are described in Appendix A, including responses to the NRC staff evaluations within the Supplemental Safety Evaluation Reports (SSERs). Technical review, resolution and corrective and preventive actions for all reportable issues identified during the performance of the Corrective Action Program (CAP) are described in Appendix B. The issues contained in Appendix B are those which have been determined to be reportable under the provisions of 10CFR50.55(e).

Comanche Peak Response Team (CPRT) and external issues are listed below with issue numbers corresponding to the subappendix number in Appendix A. Issues A1 through A10 were identified in Issue Resolution Reports (IRRs), Issues A11 through A15 were identified in Issue Specific Action Plans (ISAPs), Issues A16 through A27 were Independent Assessment Program (IAP) issues raised by CYGNA, and Issue A28 is an issue from the Supplemental Safety Evaluation Report No. 10 (SSER 10).

Issue No.	Issue Title
A1	Seismic Qualification of Seismic Category I BOP Equipment and Components
A2	High Energy Line Breaks
A3	Overpressure Protection of Safety-Related Piping and Equipment
A4	Specification of Mechanical Components
A5	Determination of Heat Loads for HVAC Equipment Sizing
A6	Fire Protection
A7	Control of Welding Processes
A8	Internal and Turbine Missile Evaluations
A9	System Design
A10	Environmental Conditions and Requirements
A11	Large Bore Piping Configuration
A12	Small Bore Piping Configuration
A13	Piping Bend Fabrication
A14	Pipe Welds/Material
A15	Mechanical Equipment Installation
A16	CCW System Maximum Temperature
A17	CCW Surge Tank Isolation on High Radiation Signal
A18	Single Failure-RCP Thermal Barrier
A19	Missing Valve Sizing Calculations
A20	CCW Surge Tank Sizing and Design Basis
A21	CCW Pump Motor Sizing
A22	CCW Surge Tank Vent/Relief
A23	CCW Valves HV-4572 and HV-4573 Partial Open Position Setpoint Calculation
A24	Mechanical Equipment Separation Criteria
A25	CCW Pump Discharge Pressure Switch Setpoint Basis

A26	CCW Valves HV-4572 and HV-4574 Inlet Pressure and Shutoff Differential Pressure
A27	Flow Balancing Orifice Sizing Data Transfer
A28	SSER 10 Review

Issues identified during the performance of the mechanical portion of the Corrective Action Program (CAP) which have been determined to be reportable under the provisions of 10CFR50.55(e) are listed below with issue numbers corresponding to the subappendix number in Appendix B which addresses the issue:

Issue No.	Issue Title
B1	SDAR-CP-88-017, Control Room Habitability
B2	SDAR-CP-87-015, Air Accumulators for Control Valves
B3	SDAR-CP-87-025, DG Fuel Oil Tank Vent Missile Protection
B4	SDAR-CP-87-050, Turbine Driven Auxiliary Feedwater Pump Bearing Temperature
B5	SDAR-CP-87-064, Design Basis Tornado Analysis
B6	SDAR-CP-87-090, Residual Heat Removal Relief Valve Piping
B7	SDAR-CP-87-103, Cracked Gears in Valve Operators
B8	SDAR-CP-88-016, Containment Spray Chemical Additive Tank
B9	SDAR-CP-87-019, Ambient Temperature Effects on Main Steam Isolation Valves Actuators
B10	SDAR-CP-87-137, Diesel Generator Governor Oil Cooler Baffle Plate
B11	SDAR-CP-87-046, Containment Spray Pump Motor Rotor/Stator Gap

5.0 CORRECTIVE ACTION PROGRAM (CAP) METHODOLOGY AND RESULTS

5.1 METHODOLOGY AND WORK PERFORMED

5.1.1 Licensing Commitments, Design Criteria, and Design Basis Documentation

SWEC reviewed the licensing documentation in order to identify licensing commitments related to CPSES mechanical systems and components. Documentation reviewed included the FSAR, SER, SSERs, NRC Regulatory Guides, IE Bulletins and TU Electric/NRC licensing correspondence.

SWEC then established the design criteria based on the identified licensing commitments. The design criteria which assure compliance with the licensing commitments, were consolidated and documented in Design Basis Documents (DBDs). The design criteria served as the basis for the validation effort.

The mechanical Design Basis Documents (DBDs) include mechanical systems design and radiological/safety analysis design criteria as well as design criteria for those aspects of the CPSES Unit 1 and Common design which are common to more than one mechanical system. The mechanical Design Basis Documents (DBDs) are listed in Table 5-1.

5.1.1.1 Verification of Design Criteria and Resolution of Issues

Technical audits have been performed to provide additional assurance that the design criteria are technically correct and embody the mechanical licensing commitments, and that all related Comanche Peak Response Team (CPRT), external and mechanical Corrective Action Program (CAP) identified issues have been resolved. To assure that the licensing commitments related to mechanical design have been identified, and appropriate design criteria have been established, the SWEC Corporate Quality Assurance (QA) and the Comanche Peak Response Team (CPRT) conducted overviews. SWEC Quality Assurance (QA) audits were performed as described in Section 5.3. The Comanche Peak Response Team (CPRT) overview is being performed by the Engineering Functional Evaluation (EFE) and TU Electric Quality Assurance (QA) as described in Section 5.3.

TU Electric's Quality Assurance (QA) Technical Audit Program (TAP) is auditing the Corrective Action Program (CAP) to assure that the design criteria are reconciled with the licensing commitments. In addition, CYGNA Energy Services (CYGNA) is reviewing SWEC's resolution of mechanical issues (Issue Numbers A16 through A27, as identified in Section 4.0) that were identified by the CYGNA Independent Assessment Program (IAP).

SWEC's resolution of the Comanche Peak Response Team (CPRT) and external issues is described in Appendix A of this Project Status Report (PSR). SWEC's resolution of issues identified during the performance of the mechanical portion of the Corrective Action Program (CAP) is described in Appendix B of this Project Status Report (PSR).

5.1.2 Design Validation Process

The CPSES Unit 1 and Common mechanical design was validated by comparison of the design documentation (calculations, drawings, specifications, and related design documents) for each mechanical system to the criteria embodied in the Design Basis Documents (DBDs). Where the existing design did not satisfy the design criteria, it was modified to satisfy the design criteria.

The mechancial portion of the Corrective Action Program (CAP) validation process was performed in accordance with comprehensive design control procedures. The key design control procedures implementing the mechanical portion of the Corrective Action Program (CAP) are listed in Table 5-2. These design control procedures assure compliance with the design criteria and the resolution of the Comanche Peak Response Team (CPRT) and external issues, and issues identified during the performance of the Corrective Action Program (CAP).

Design documents were reviewed to assure that (1) they were in conformance with Design Basis Documents (DBDs), and (2) they were correct and consistent with interfacing design documents. In order to provide an efficient approach to the organization of design data, the mechanical design validation was documented in 29 Design Validation Packages (DVPs). Each Design Validation Package (DVP) identifies or contains the following items:

- Design Basis Documents (DBDs) which serve as the primary basis for design validation

- Design Documents (e.g., calculations, drawings, and specifications)

- Other related documents (e.g., NSSS interface requirements, Significant Deficiency Analysis Reports (SDARs), and Comanche Peak Response Team (CPRT) and external issues resolution documents)

Separate detailed discussions of this process follow for safety-related mechanical systems and for radiological/safety analyses.

5.1.2.1 Safety-Related Mechanical Systems

The CPSES Unit 1 and Common mechanical systems identified in Section 3.0 were validated by performance of the following:

- Review of calculations

- Review of drawings

- Review of system nuclear safety class and class boundaries

- Review of system overpressure protection

- Review of installation specifications

- Review of procurement specifications

- Review of system mechanical components
- Review of NSSS design interface

Each of these validation activities is described below as they were applied to the mechanical systems.

Review of Calculations

The SWEC mechanical design validation is based on SWEC validated calculations which substantiate the design. Validation of the original calculations was performed using four approaches:

1) Validation of original calculations

   Original calculations were validated by review or by an alternate calculation which showed that the results of the original calculations were acceptable.

2) SWEC calculations which replace the original calculations

   Replacement calculations were developed which completely replaced and superseded the original calculations.

3) Validation of original calculations by development of supplemental calculations

   Supplemental calculations were developed for designs for which the original calculations needed only minor revision or enhancement to assure compliance with design criteria specified in the Design Basis Documents (DBDs). The combination of the existing and these supplemental calculations form the basis for the validation of the design.

4) Development of new calculations

   New calculations were developed, when required, to provide complete documentation of the mechanical design validation.

More than 760 original safety-related mechanical calculations were reviewed. The review of calculations validated that design inputs are correct and current, and that the assumptions, methodology, and criteria used in the calculations were consistent with the design criteria established and documented in the Design Basis Documents (DBDs). Those calculations which did not comply with the design criteria were either supplemented or replaced by new calculations.

More than 280 safety-related mechanical calculations were developed by SWEC as part of the mechanical portion of the Corrective Action Program (CAP) to replace or supplement original calculations or to provide new calculations. These calculations, in conjunction with the validated original calculations, demonstrate compliance with the design criteria.

Types of design calculations which were validated for each safety-related mechanical system included:

- Design pressures and temperatures
- Operating conditions, pressures and temperatures
- Pipe wall thickness
- Pump capacity
- Tank capacity
- Heat exchanger capability
- Instrument process setpoints
- Fluid flow pressure drop
- Relief valve capacity
- Vacuum and overpressure protection
- System cooling requirements
- Other engineered component requirements (e.g., valves, strainers, demineralizers)

The calculation results were used in the validation of the following design documents:

- Specifications
- Drawings
- Input for pipe stress analysis packages
- Radiological/safety analyses
- Other calculations including instrument/control setpoints calculations

Inconsistencies between the calculations and any of the above items were identified and resolved. Results from the calculation validation were provided to the appropriate engineering organizations for interfacing activities.

Review of Drawings

The drawing review addressed safety-related aspects of mechanical design. The design was validated to comply with the licensing commitments and design criteria specified in the Design Basis Documents (DBDs). Three types of drawings were validated. These included Plant General Arrangement, Flow Diagrams and Piping Isometric drawings.

Plant General Arrangement drawings were used in the mechanical validation process as source documents for general location of equipment and equipment foundations, building cubicle arrangement, piping and equipment general arrangement and general air flow directional concepts. Where information from these drawings was used to validate plant design, the as-built plant arrangement is reconciled by field validation during the Post Construction Hardware Validation Program (PCHVP).

Validation of system flow diagram drawings, which schematically depict the system components, flow paths, system interfaces and design parameters, was performed by verifying that the system designs are based on validated design calculations. The flow diagrams were reviewed against piping isometric drawings and inconsistencies were resolved to validate the isometric drawings.

The following items were considered in the review of flow diagrams and piping isometric drawings:

- Nuclear safety class
- Separation of mechanical flow paths
- Nuclear safety class boundary isolation configuration
- Single failure criterion
- ASME Section III Code overpressure protection
- Instrumentation/Control requirements
- ASME Section XI Code testing requirements
- System operating conditions
- Flow diagrams and piping isometric drawing consistency
- Containment isolation design
- External missile protection
- NSSS/component vendor interface requirements

<u>Review of System Nuclear Safety Class and Class Boundaries</u>

This review validated that the nuclear safety class designations and nuclear safety class boundary isolation provisions of the nuclear safety class interfaces in fluid systems meet the design criteria as specified in the Design Basis Document (DBD) (Reference 5). Single failure, manual or automatic operation, and the number and type of safety-related isolation components were considered in the review.

Flow diagrams were reviewed to determine that the proper nuclear safety classification had been assigned. After each system was validated for the correct nuclear safety classification, the isolation configuration at the nuclear safety class boundaries was reviewed. The following items were reviewed:

- Number and type of isolation devices
- Nuclear safety classification of isolation devices
- Isolation device control instrumentation
- Automatic or manual isolation device closure
- Remote or local isolation device control

Review of System Overpressure Protection

All safety-related mechanical systems were reviewed for overpressure protection compliance with the ASME Section III Code (Reference 6).

System design pressure/temperature conditions were established and documented by calculation. This included the identification of potential pressure sources and consideration of pressure relief devices within the system boundaries. Each system was reviewed to identify isolable components and high/low pressure system interfaces. Each system design pressure evaluation considered the following potential pressure sources:

- Pumps and compressors
- Isolable heat exchangers
- Internal heat energy
- Heat added due to maximum environmental changes
- High/low pressure system interfaces
- Component failure/malfunction
- Static liquid head

Once system design temperature and pressure were established, each system/component was validated to the established design conditions.

Pressure relief devices were validated for compliance with ASME Section III Code and system design requirements as detailed below:

- Capacity and setpoint calculations were validated or new calculations performed
- Valve locations, actual inlet line and discharge line routings were reviewed against these calculation results
- Vendor documentation and as-built information were reviewed to demonstrate that the purchased hardware meets the capacity and setpoint requirements
- Input for the piping stress analysis package was reviewed

Atmospheric tanks were validated for venting and relief protection during makeup and drawdown system conditions.

Review of Installation Specifications

The original mechanical installation specifications were reviewed and revised to be consistent with the validated design, to resolve Comanche Peak Response Team (CPRT) - Quality of Construction (QOC) issues and to identify the required inspection attributes and acceptance criteria. SWEC then

identified revisions to the construction procedures and Quality Control (QC) inspection procedures which were consistent with the installation specifications. The construction procedures and QC inspection procedures were subsequently revised and issued. After issue they were used for installation and inspection activities. The specifications received interdisciplinary and interorganizational review for design interface consistency.

Review of Procurement Specifications

The original procurement specifications were reviewed as a source of interface design requirements and related vendor data to be used in the validation of mechanical components described below. Validation of the mechanical components provided assurance that the specifications used to specify and purchase safety-related components produced components which comply with design criteria and system functional requirements.

Review of System Mechanical Components

The vendor component documentation was reviewed for compliance with the validated system design. The ability of individual components to meet design pressures and temperatures and system performance requirements was validated using actual component performance and fabrication data (e.g., pump shop test curves and heat exchanger geometry/heat transfer coefficients). The following items are typical of the parameters validated for major system mechanical components:

- Pumps - flow, discharge and suction pressure, power requirements
- Heat exchangers - heat transfer capability, flow requirements, pressure drop
- Tanks - Capacity, pressure, vacuum protection, overpressure protection
- Relief valves - Setpoint, flow capability, backpressure
- Piping, valves and other piping in-line components - Size, pressure drop, valve type, valve closure time

Review of NSSS Design Interface

Westinghouse was the NSSS supplier for CPSES. SWEC validated that the interface design criteria for the NSSS were properly applied and implemented for the CPSES Unit 1 and Common design.

The NSSS supplier provided Design Basis Documents (DBDs) (References 7 through 13) and interfacing documentation (Reference 14) which describe the specific interface requirements between the NSSS and interfacing systems design. SWEC reviewed the above interface requirements and validated that these interfaces were properly implemented.

The design criteria on the Westinghouse NSSS flow diagrams were reviewed against the CPSES NSSS flow diagrams for consistency of design configuration, mechanical train alignment, component placement and identification, design parameters identification and instrumentation and controls identification. Inconsistencies between these flow diagrams were evaluated and resolved. The NSSS piping isometric drawings were also reviewed against the CPSES NSSS flow diagrams to assure that the isometric drawings reflect the requirements of the flow diagrams.

5.1.2.2 Radiological/Safety Analyses

Validation of the radiological/safety analyses identified below has been performed by review and validation of original calculations and by development of replacement, supplemental and new calculations. The validation included the following radiological/safety analyses:

- Equipment Radiation Dose Analyses
- Radiation Source Term Analyses
- Radiological Accident Analyses
- Subcompartment Pressurization Analyses
- Containment LOCA and MSLB Analyses
- Containment Fission Product Removal Analyses
- Control Room Habitability Analyses

More than 100 original radiological/safety analysis calculations were reviewed and validated. In addition, more than 160 replacement, supplemental and new calculations were developed. These calculations, in conjunction with the validated original calculations, demonstrate compliance with the design criteria.

Equipment Radiation Dose Analyses

Replacement calculations were developed to determine the radiation dose for specific areas of CPSES Unit 1 and Common where safety-related components or systems are located.

The radiation doses were determined in the form of exposure to gamma, beta, and neutron radiation, as appropriate. These calculations established the maximum enveloping radiation doses applicable to general areas where the safety related equipment are located. In addition to the enveloping radiation doses, equipment specific radiation doses are calculated on a case by case basis. The radiation doses were provided as input into the equipment qualification Corrective Action Program (CAP).

Radiation Source Term Analyses

The radiation source terms were used as input into the radiological accident analyses. The validation of the radiation source terms was based on the

design criteria specified in the Design Basis Document (DBD) (Reference 15). Supplemental and new calculations validated that the radiation source terms used for CPSES Unit 1 and Common comply with the design criteria as specified in the Design Basis Document (DBD) and contain the proper data associated with the FSAR postulated accident conditions.

Radiological Accident Analyses

The validated radiological accident analyses have determined that the Exclusion Area Boundary (EAB) and the Low Population Zone (LPZ) boundary, in conjunction with operation of the dose mitigating safety-related systems and structures, provide assurance that the calculated radiological doses resulting from the postulated accidents are within the requirements of 10CFR100.11. These validated analyses include atmospheric dispersion factors (X/Qs) identified in FSAR Section 2.3.4. Validation of the original X/Q values using accepted NRC methodology (Reference 44) was performed utilizing the latest 6 month meteorological data. Results indicate that the X/Q values utilized in the radiological accident analyses are acceptable. In addition, the most recent 1 year meteorological data period being collected by the present onsite tower, will be used to provide further assurance of the validation of the atmospheric dispersion characteristics identified in the FSAR. The validation of the radiological accident analyses were based on the design criteria specified in the Design Basis Document (DBD) (Reference 16).

Subcompartment Pressurization Analyses

A subcompartment is defined as a fully or partially-enclosed volume within the containment that houses high energy piping. A postulated pipe rupture produces a short-term pressure differential across the walls of the subcompartments and/or on safety-related components situated within the affected subcompartments. SWEC developed supplemental and replacement calculations for the subcompartment pressurization analyses based on the design criteria specified in the Design Basis Document (DBD) (Reference 17). The results of these calculations provide validated subcompartment differential pressures. These differential pressures are provided as input to the civil/structural portion of the Corrective Action Program (CAP).

Containment LOCA and MSLB Analyses

The containment pressure and temperature transient responses to loss of coolant accident (LOCA) and main steam line break (MSLB) were analyzed for a spectrum of ruptures of the Reactor Coolant System and the Main Steam System. Also validated were the analyses for inadvertent initiation of containment spray, maximum heat rejection rate from the containment to the cooling water system, maximum containment liner temperature, and containment spray coverage.

SWEC developed new and replacement calculations based on the design criteria contained in the Design Basis Document (DBD) (Reference 17). These calculations demonstrate that the analyses are technically adequate and provide proper documentation to demonstrate compliance with design criteria specified in the Design Basis Document (DBD).

Containment Fission Product Removal Analyses

The containment fission product removal analysis included the containment spray and sump water pH, the fission product removal coefficients, and the containment water level. The validation of the analyses was accomplished by the development of replacement calculations. This validation demonstrates that the analyses are technically adequate and provide proper documentation to demonstrate compliance with the design criteria specified in the Design Basis Document (DBD).

Control Room Habitability Analyses

SWEC developed replacement calculations to validate the control room habitability analyses. These validated analyses have demonstrated that the control room and technical support center maintain a safe and habitable environment following a radiation or chemical release. The validation of the control room habitability analyses was based on the design criteria specified in the Design Basis Document (DBD) (Reference 18). The results of these calculations validated that these analyses comply with the design criteria specified in the Design Basis Document (DBD).

5.1.2.3 Interfaces

The mechanical validation process involved internal interfaces among SWEC design disciplines, as well as external interfaces with TU Electric and other organizations involved in the Corrective Action Program (CAP). Organizational interfaces as shown in Figure 5-1 include those with other SWEC disciplines, TU Electric, Westinghouse, SWEC-PSAS, Ebasco, and Impell. Interfaces with these organizations are procedurally controlled to assure:

- Consistency of design criteria
- Completeness of the information incorporated in each Design Validation Package (DVP)
- Proper transfer of design data between interfacing organizations
- Uniform application of design control procedures
- Coordination of corrective and preventive actions

The stress input information for the mechanical systems, which was used as input for the SWEC-PSAS piping stress analyses, was validated. This included flow, pressure, and temperature for normal, upset, emergency, and faulted system operating conditions.

5.1.2.4 Final Reconciliation Process

The purpose of the final reconciliation process is to consolidate the design validation analyses, hardware modifications, preoperational test results, and inspection documentation to assure consistency of the mechanical design. The final reconciliation of mechanical design incorporates the following:

- The Post Construction Hardware Validation Program (PCHVP) results

- Resolution of the mechanical hardware related Comanche Peak Response Team (CPRT) and external issues.

Final reconciliation also includes confirmation that the interfacing organizations have accepted the mechanical results as compatible with their validated design. Interfacing organizations are depicted on Figure 5-1.

In addition, open items, observations, and deviations related to the mechanical portion of the Corrective Action Program (CAP) that were identified by the TU Electric Technical Audit Program (TAP) and Engineering Functional Evaluation (EFE) are resolved prior to the completion of the final reconciliation. Open items from TU Electric Significant Deficiency Analysis Reports (SDARs) (10CFR50.55(e)) are also resolved during the final reconciliation. At the conclusion of final reconciliation, the Unit 1 and Common Design Validation Packages (DVPs) are compiled.

5.1.3 Post Construction Hardware Validation Program (PCHVP)

The Post Construction Hardware Validation Program (PCHVP) (Reference 20) is the portion of TU Electric's Corrective Action Program (CAP) which validates the final acceptance attributes for safety-related hardware. The Post Construction Hardware Validation Program (PCHVP) process is shown diagrammatically in Figure 5-2.

The input to the Post Construction Hardware Validation Program (PCHVP) is contained in the installation specifications. The installation specifications implement the licensing commitments and design criteria of the Design Basis Documents (DBDs), which were developed during the Corrective Action Program (CAP) design validation process.

Final acceptance inspection requirements identified in the validated installation specifications were used to develop the Post Construction Hardware Validation Program (PCHVP) attribute matrix. This matrix is a complete set of final acceptance attributes identified for installed hardware. The Post Construction Hardware Validation Program (PCHVP), by either physical validations or through an engineering evaluation methodology, assures that each of the attributes defined in the attribute matrix is validated.

Physical validation of an attribute is performed by Quality Control (QC) inspection or engineering walkdown, for accessible components. Quality Control (QC) inspections and engineering walkdowns are controlled by appropriate Field Verification Method (FVM) procedures.

The Post Construction Hardware Validation Program (PCHVP) engineering evaluation depicted in Figure 5-2, is procedurally controlled to guide the Corrective Action Program (CAP) responsible engineer through the evaluation of each item on the attribute matrix to be dispositioned by the engineering evaluation method. Dispositions of each attribute will be clearly documented. If the technical disposition of the final acceptance attribute is "not acceptable" or the attribute cannot be dispositioned based on available information, an alternate plan consisting of additional evaluations, testing, inspections/walkdowns or modifications, as necessary, will be developed to demonstrate and document the acceptability of the attribute.

Recommendations from the Comanche Peak Response Team (CPRT) effort comprise a significant portion of the evaluation. A major component of the Comanche Peak Response Team (CPRT) program has been the inspection of a comprehensive, random sample of existing hardware using an independently derived set of inspection attributes. The inspection was performed and the results were evaluated by Third Party personnel in accordance with Appendix E to the Comanche Peak Response Team (CPRT) Program Plan (Reference 21). The scope of the inspection covered the installed safety-related hardware by segregating the hardware into homogeneous populations (by virtue of the work activities which produced the finished product). Samples of these populations were inspected to provide reasonable assurance of hardware acceptability in accordance with Appendix D to the Comanche Peak Response Team (CPRT) Program Plan.

Corrective action recommendations were made to TU Electric based on the evaluated findings when a Construction Deficiency existed, an Adverse Trend existed, or an Unclassified Trend existed, as defined in accordance with Appendix E to the Comanche Peak Response Team (CPRT) Program Plan.

The Post Construction Hardware Validation Program (PCHVP) assures that all related Comanche Peak Response Team (CPRT) recommendations are properly dispositioned.

Figure 5-2 illustrates that during the evaluation of a given attribute from the Post Construction Hardware Validation Program (PCHVP) attribute matrix, the initial task of the Corrective Action Program (CAP) responsible engineer is to determine if any of the following statements are true:

a. The attribute was recommended for reinspection by the Comanche Peak Response Team (CPRT).

b. Design validation resulted in a change to design or to a hardware final acceptance attribute that is more stringent than the original acceptance attribute or the Comanche Peak Response Team (CPRT) did not inspect the attribute.

c. Design validation resulted in new work, including modification of the existing hardware.

If the Comanche Peak Response Team (CPRT) had no recommendations and Items b. or c. above do not apply, the attribute under consideration will be accepted. This conclusion is justified by the comprehensive coverage of the Comanche Peak Response Team (CPRT) reinspection and the consistently conservative evaluation of each finding from both a statistical and adverse trend perspective. The attribute matrix is then updated to indicate that neither the engineering walkdown nor Quality Control inspection of the attribute is necessary. A completed evaluation package is prepared and forwarded to the Comanche Peak Engineering (CPE) organization for concurrence. The evaluation package becomes part of the Design Validation Package (DVP) after Comanche Peak Engineering (CPE) concurrence is obtained.

If any of the three statements above are true, it is assumed that the final acceptance attribute must be further evaluated as follows:

<u>Determine Attribute Accessibility</u>

The Corrective Action Program (CAP) responsible engineer will determine if the attribute is accessible. If the attribute is accessible, a field validation of the item's acceptability will be performed and documented in accordance with an approved Field Verification Method (FVM).

If the Corrective Action Program (CAP) responsible engineer reaches the conclusion that the attribute is inaccessible, an engineering evaluation will be conducted by technical disposition of available information.

After completing the attribute accessibility review, the Corrective Action Program (CAP) responsible engineer will update the attribute matrix, as necessary, to reflect the results of that review.

Technical Disposition

The Corrective Action Program (CAP) responsible engineer identifies the data to be considered during the subsequent technical disposition process. Examples of such items used in this disposition may include, but are not limited to:

- Historical documents (e.g., specifications, procedures, and inspection results)
- Comanche Peak Response Team (CPRT) and external issues
- Construction practices
- Quality records
- Test results
- Audit reports
- Authorized Nuclear Inspector (ANI) records
- Surveillance reports
- NCRs, DRs, SDARs, and CARs
- Inspections conducted to date
- Results of Third Party reviews
- Purchasing documents
- Construction packages
- Hardware receipt inspections

After compiling the data identified as pertinent to the attribute, the technical disposition will be performed. The actual steps and sequence of actions required for each technical disposition will differ; however, the tangible results from each technical disposition will be consistent. These results will include as a minimum:

- A written description of the attribute;
- A written justification by the Corrective Action Program (CAP) responsible engineer for acceptance of the attribute;
- A written explanation of the logic utilized to conclude that the attribute need not be field validated;

- A chronology demonstrating that the attribute has not been significantly altered by redesign;

- All documents viewed to support the disposition;

- Concurrence of the acceptance of the attribute's validity by Comanche Peak Engineering (CPE).

If the Corrective Action Program (CAP) responsible engineer concludes that the data evaluated represents evidence of the attribute's acceptability, the conclusion will be documented. The documentation will be reviewed and approved by Comanche Peak Engineering (CPE) and filed in the Design Validation Package (DVP). If the Corrective Action Program (CAP) responsible engineer determines that the data reviewed does not provide evidence of the attribute's acceptability, the documentation will explain why the attribute cannot be accepted and recommend an alternate course of action. The alternate course of action may take various forms such as making the attribute accessible and inspecting it, or testing to support the attribute's acceptability. This alternate plan, after approval by Comanche Peak Engineering (CPE), will be implemented to validate the attribute.

In summary, the Post Construction Hardware Validation Program (PCHVP) is a comprehensive process by which each attribute in the PCHVP attribute matrix is validated to the validated design. The TU Electric Technical Audit Program (TAP) will audit the Post Construction Hardware Validation Program (PCHVP). This audit program is complemented by the Engineering Functional Evaluation (EFE) being performed by an independent team comprised of Stone & Webster, Impell, and Ebasco engineering personnel working under the Stone & Webster Quality Assurance (QA) Program and subject to oversight directed by the Comanche Peak Response Team's (CPRT) Senior Review Team (SRT). The Post Construction Hardware Validation Program (PCHVP) will provide reasonable assurance that the validated design has been implemented for safety-related hardware.

SWEC prepared Post Construction Hardware Validation Program (PCHVP) implementation procedures (References 20 and 22) for the mechanical portion of the Corrective Action Program (CAP). The hardware validation process includes modifications, whenever necessary, to bring the mechanical related hardware into compliance with the validated design. The attributes contained within the Post Construction Hardware Validation Program (PCHVP) attribute matrix for mechanical related hardware incorporate the Comanche Peak Response Team (CPRT)-Quality of Construction (QOC) recommended corrective actions. A summary of mechanical final acceptance attributes is presented in Table 5-3. The specific final acceptance attributes are contained in the "Commodity/Attribute Matrix" (Reference 43).

5.2 RESULTS

5.2.1 Design Validation Results

The validation of the Unit 1 and Common mechanical design has been completed as described in this Project Status Report (PSR). This effort[1] included:

- Validation of over 850 original calculations
- Validation of over 3000 drawings
- Development of over 475 replacement, supplemental and new calculations
- Validation of over 3600 components
- Revision of 5 installation specifications
- Validation of approximately 30 component procurement specifications
- Resolution of over 700 Tenera L. P. (TERA) Discrepancy Issue Reports (DIRs)
- Validation of over 400 NSSS interface requirements

The mechanical validation identified the following hardware modifications:

- 60 overpressure protection devices were modified or added to the design of several systems
- The venting design for 8 tanks was modified to comply with overpressure protection, seismic and missile protection requirements
- Modifications were identified for 4 system control functions/ hardware to preclude overpressure conditions
- Pipe replacement was required in 1 instance where the piping did not meet nuclear safety class requirements
- Two additional isolation valves were added to system design where redundancy was required for compliance with single failure criterion
- Eight system design changes were made to relocate or adjust relief/isolation valves, install orifices, and provide vacuum breakers to minimize flow transient effects

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[1]The totals indicated include instrumentation and controls items related to mechanical system design.

- Two radiation monitors and additional instrumentation were added to the design to accomplish isolation requirements consistent with radiological/safety accident analysis results for control room habitability

- Two duplex strainers and two sampling connections were added in the diesel generator fuel oil transfer system design to improve system availability and reliability

- Design changes were made to the auxiliary feedwater system, the turbine driven auxiliary feedwater pump driver and its steam supply isolation valves to improve reliability

- Design changes were made to the incore instrumentation door and floor plate to reduce the maximum containment flood level

- Isolation (root) valves were added to the design of 8 instruments in 2 systems to satisfy requirements of the ASME Section III Code

- Four component cooling water heat exchangers were identified to be partially retubed to alleviate problems resulting from heat exchanger vibrations.

- The design of the service water system was modified to improve resistance to potential long term corrosion

The design validation effort, in conjunction with the design modifications, results in a mechanical design and associated documentation that is in conformance with CPSES licensing commitments and provides assurance that the mechanical systems and components are designed to perform their safety functions.

5.2.2 Post Construction Hardware Validation Program (PCHVP) Results

The Post Construction Hardware Validation Program (PCHVP) is being implemented through the verification of final acceptance attributes for systems and components for Unit 1 and Common as discussed in Section 5.1.3.

5.3 QUALITY ASSURANCE (QA) PROGRAM

All SWEC activities of the CPSES Unit 1 and Common mechanical portion of the Corrective Action Program (CAP) were performed in accordance with SWEC's Quality Assurance (QA) program. This program implements applicable requirements of SWEC's Topical Report SWSQAP 1-74A (Reference 23), "Stone & Webster Standard Quality Assurance Program", which has been approved by the NRC.

In accordance with the Quality Assurance (QA) Program, a project-specific QA Program[1] covering the essentials of the SWEC Corrective Action Program (CAP) was developed, including detailed procedures (Reference 24). These procedures were distributed to supervisory engineers and were readily available to mechanical Corrective Action Program (CAP) personnel. The issuance of design criteria, validation procedures and major revisions was followed up with detailed training programs for the applicable personnel. In particular, engineers on the project received training in the procedure for preparation, review and approval of Design Basis Documents (DBDs) (Reference 25) and in the design validation procedures for calculations, drawings/diagrams, and specifications (References 26, 27, and 28).

A project Quality Assurance (QA) manager, who is directly responsible to the SWEC Vice President of QA and has management experience in auditing and QA Program procedure development for engineering activities, was assigned to the project in the earliest stages of the project. This reporting responsibility assures independence of the Quality Assurance (QA) functions. The SWEC Quality Assurance (QA) manager has a staff assigned to assist him in his duties. These individuals provide assurance that the Quality Assurance (QA) Program properly addresses project activities and assist SWEC personnel to implement the QA Program properly.

To date, more than 45,000 man-hours have been expended by SWEC in activities directly attributable to the overall Project Quality Assurance (QA) Program (i.e., training, procedure development, auditing, and the project QA Manager's staff).

The adequacy and implementation of this Quality Assurance (QA) Program and the adequacy of the work performed under the QA Program was extensively audited by SWEC's Engineering Assurance (EA) Division[2], SWEC's Quality Assurance Auditing Division (QAAD), and TU Electric's Quality Assurance (QA) Program. A total of 13 audits of the mechanical discipline were performed by these organizations to date for CPSES Unit 1 and Common as follows:

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[1]The overall (SWEC) Quality Assurance (QA) Program encompasses the mechanical, electrical, instrumentation & controls, and civil/structural portions of the Corrective Action Program (CAP).

[2]The SWEC Engineering Assurance (EA) Division is an integral part of SWEC's Corporate Quality Assurance Program (Reference 23).

SWEC - EA	6
SWEC - QAAD	1
TU Electric QA	11

Collectively these audits evaluated the technical adequacy of the engineering product (e.g., Design Basis Documents (DBDs), validation activities, calculations, drawings, and specifications) and assessed the adequacy and implementation of the SWEC Quality Assurance Program. These audits have resulted in enhancements to the procedures and methods, and thus, contributed to the overall quality of the CPSES mechanical design. A summary of these audits is presented in Sections 5.3.1 and 5.3.2.

In addition to the audits described above, TU Electric has initiated the Engineering Functional Evaluation (EFE) (Reference 29). The EFE began auditing the mechanical portion of the Corrective Action Program (CAP) in June 1987. The Engineering Functional Evaluation (EFE) is an overview program which is performing an independent, in-depth technical evaluation of the Corrective Action Program (CAP) to provide additional assurance that the CAP is effectively implemented. The Engineering Functional Evaluation (EFE) is conducted under the SWEC Quality Assurance (QA) Program and is directed by a Program Manager who reports to the SWEC Chief Engineer, Engineering Assurance. The Engineering Functional Evaluation (EFE) is performed by highly qualified and experienced engineers from SWEC, Impell and Ebasco who have not been involved with previous engineering and design work at CPSES. The Engineering Functional Evaluation (EFE) is performed in a formal, preplanned and fully documented manner to provide objective evidence of completion of the planned scope of the evaluation and to provide documentation of its results and conclusions. The Engineering Functional Evaluation (EFE) is comparable in scope, level of effort and personnel qualifications to integrated, independent design inspections and verifications conducted at other nuclear plants.

The NRC - Office of Special Projects (OSP) also conducted inspections of the project in SWEC offices beginning in August, 1987. The inspections involved technical evaluations of the design validation process and focused primarily on the review of calculations and Design Basis Documents (DBDs), and their compliance with licensing commitments. In addition, the NRC-OSP inspections included a review of activities performed under the Engineering Functional Evaluation (EFE).

Surveillance activities have been conducted by SWEC Engineering Assurance (EA) to assure conformance to procedures and standards.

The activities described above collectively represent a very detailed and complete assessment of the following:

1. Adequacy of the Quality Assurance (QA) Program.

2. Implementation of the Quality Assurance (QA) Program.

3. Technical adequacy of the design criteria and procedures.

4. Implementation of the design criteria and procedures.

These activities identify instances in which action is required to clarify or to modify procedures to define some activities more clearly; revise calculations to provide clarifying statements; or more properly address a situation, and provide additional training. A complete response was developed for every item identified throughout the audit process. For each audit item identified, the cause, extent of conditions and any required corrective/preventive actions are determined, properly documented, and implemented. Subsequent audits verify that appropriate actions are taken to address previously identified items.

In addition to the audits and surveillances, a rigorous Quality Control (QC) inspection program is in place on the CPSES site. Quality Control (QC) personnel are responsible for inspections of attributes, as delineated in the inspection procedures, prior to acceptance of any installation.

In summary, an appropriate level of attention has been given to the quality of activities; the Quality Assurance (QA) program is appropriate for the scope of work; project performance has been demonstrated to be in compliance with the QA program, and appropriate corrective and preventive actions were taken whenever they were required.

5.3.1 Summary of SWEC Engineering Assurance (EA) Audits

To date, SWEC Engineering Assurance (EA) has performed 6 audits of the Corrective Action Program (CAP). Audits were conducted at the Boston office and at the CPSES site. An average of seven subjects was reviewed during each of these audits. The following list of audit subjects describes the depth of auditing that has been performed:

1. Adequacy of project procedures
2. Calculations - technical adequacy and documentation
3. Nonconformance Reports (NCRs)/Test Deficiency Reports (TDRs)
4. Specification validation
5. Drawing/diagram validation
6. Calculation validation
7. Record maintenance
8. Generic Issue Reports (GIRs)
9. Discrepancy Issue Resolution Reports (DIRs)
10. Design Basis Documents (DBDs)
11. Indoctrination and training
12. Licensing activities

13. Corrective Action Requests (CARs)

14. Personnel qualification and experience verification

15. Design modifications

A chronological tabulation of SWEC Engineering Assurance (EA) audits is presented in Table 5-4.

5.3.2 Summary of Audits by TU Electric Quality Assurance (QA), Inspections by NRC-OSP and Audits by SWEC QAAD

To date, TU Electric Quality Assurance (QA) has performed 11 audits of the project. A chronological tabulation of the TU Electric audits is presented in Table 5-5.

TU Electric Quality Assurance (QA) performs programmatic audits under its vendor compliance and internal audit program and technical audits under its Technical Audit Program (TAP).

The TU Electric Technical Audit Program (TAP)[3] evaluates the technical adequacy of the design activities at CPSES through audits of the development and implementation of Design Basis Documents (DBDs), calculations, drawings, specifications, and compliance to those procedures governing these technical activities.

The SWEC Quality Assurance Auditing Division (QAAD) performed one audit of SWEC. This audit was performed to assess the project Quality Assurance (QA) manager's adherence to Corporate QA Program requirements and the adequacy of the Project's QA Program, Management Plan for Project Quality, PP-001. (Reference 24).

The NRC-Office of Special Projects (OSP) conducted an inspection of the project in August 1987 and reported its results in October, 1987. These results have been evaluated and appropriate corrective action initiated.

[3] The TU Electrical Technical Audit Program (TAP) has been in effect since January 1987. Prior to January 1987, the TU Electric Quality Assurance (QA) Department performed audits of selected engineering service contractors using technical specialists as part of its vendor audit program.

5.4 CORRECTIVE AND PREVENTIVE ACTION

SWEC has developed Design Basis Documents (DBDs) and updated the installation specifications to implement the corrective actions resulting from the mechanical portion of the Corrective Action Program (CAP). These Design Basis Documents (DBDs) contain the design criteria for validating the mechanical design of CPSES Unit 1 and Common. As a result of the mechanical portion of the Corrective Action Program (CAP) design validation, the CPSES Unit 1 and Common mechanical systems and components are validated as being capable of performing their safety-related functions.

This validation is documented in the drawings, calculations, and specifications which are contained in the Design Validation Packages (DVPs). This validated design documentation will be provided to TU Electric at the completion of the Corrective Action Program (CAP). The Design Basis Documents (DBDs) used for validation will also be provided to Comanche Peak Engineering (CPE). The validated design documentation and Design Basis Documents (DBDs) can provide the basis for configuration control of CPSES mechanical design and can be utilized by TU Electric to facilitate operation, maintenance, and future modifications in accordance with licensing commitments following issuance of an operating license.

Interfaces between organizations have been identified and addressed in detail within project procedures. Those mechanical interfaces are discussed in Section 5.1.2.3.

TU Electric Comanche Peak Engineering (CPE) is developing a program to assure a complete and orderly transfer of the engineering and design function from SWEC to CPE. The program provides for the identification of those tasks presently being performed by SWEC which are to be transferred to Comanche Peak Engineering (CPE) and the identification of all procedures, programs, training, and staffing requirements. The program is based upon three prerequisites: (a) the Corrective Action Program (CAP) effort to support plant completion is finished for the particular task; (b) the mechanical Design Validation Packages (DVPs) are complete; and (c) any required preventive action taken, as discussed in Appendices A and B, is complete.

Practical experience has been provided to Comanche Peak Engineering (CPE) engineers who have worked alongside SWEC engineers during the ongoing validation process. Experience gained by CPE engineers included changes in design documents, familiarization with procedures followed and regulatory requirements.

FIGURE 5-1

CORRECTIVE ACTION PROGRAM (CAP) TECHNICAL INTERFACES MECHANICAL

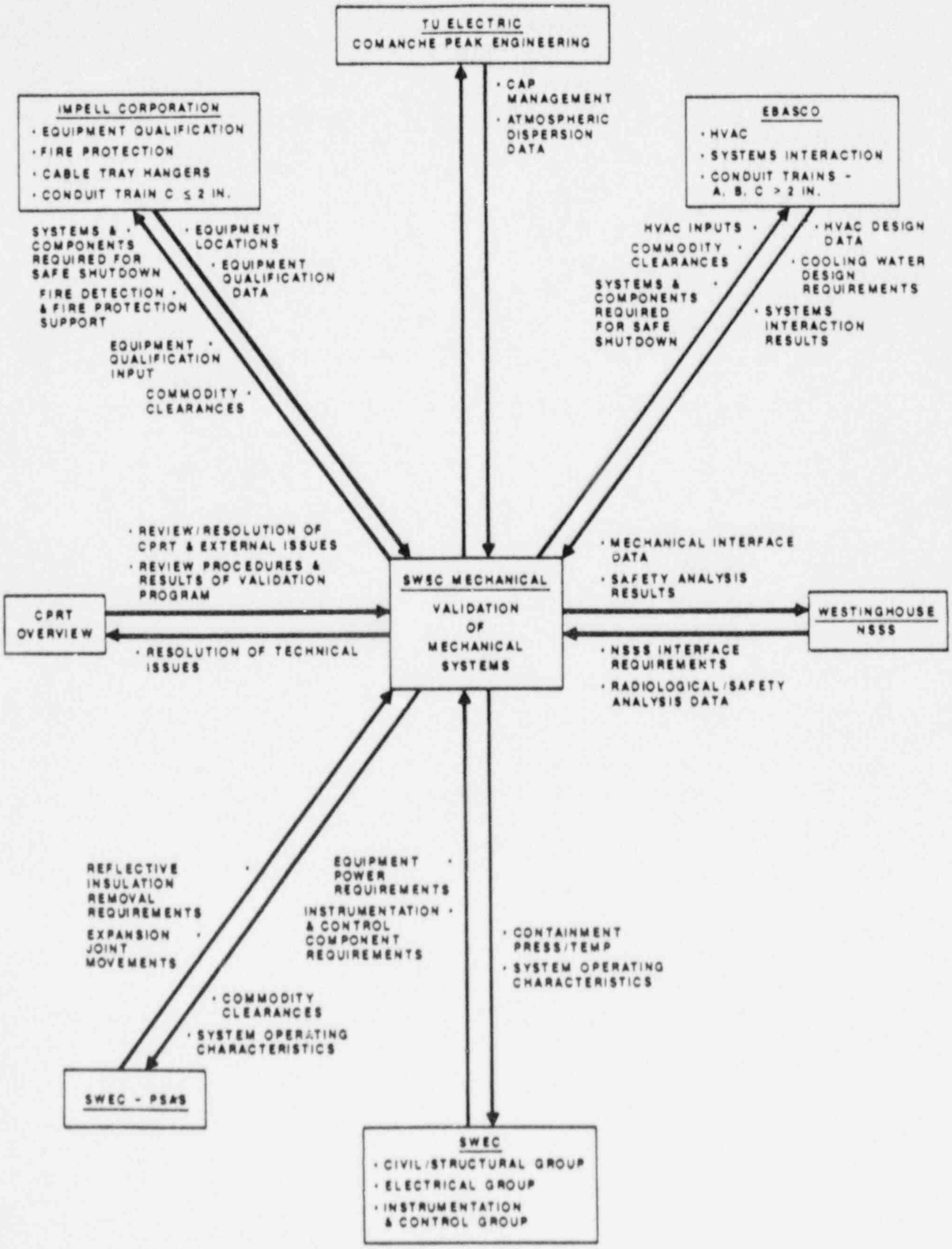

FIGURE 5-2

POST CONSTRUCTION HARDWARE VALIDATION PROGRAM (PCHVP)

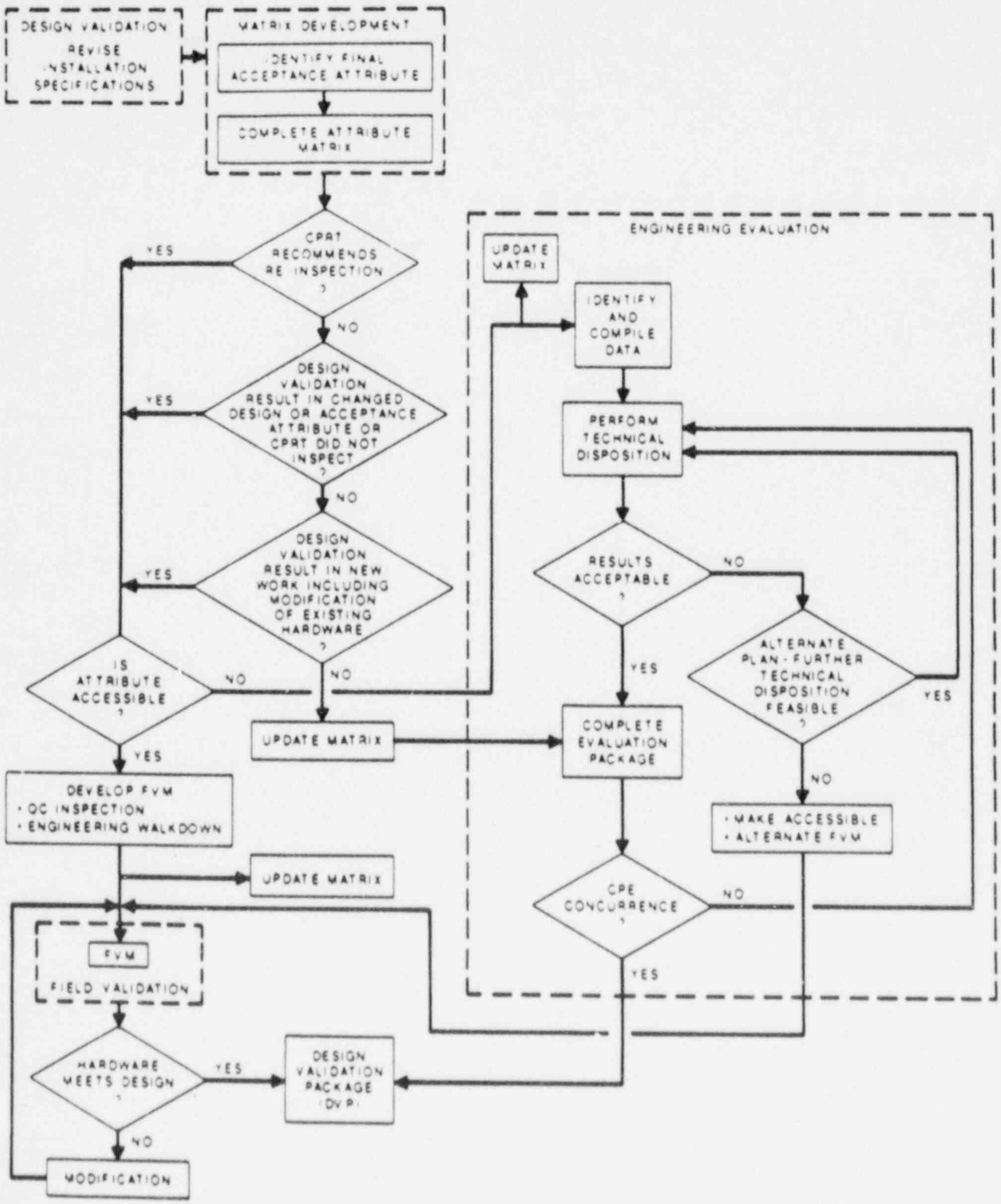

TABLE 5-1

MECHANICAL DESIGN BASIS DOCUMENTS (DBDs)

Document Number	Title
DBD-ME-003, Revision 1	Control Room Habitability
DBD-ME-008, Revision 0	Containment Analysis
DBD-ME-009, Revision 0	Tornado Venting Analysis
DBD-ME-011, Revision 1	Diesel Generator Sets
DBD-ME-013, Revision 1	Containment Isolation System
DBD-EE-023, Revision 1	Radiation Monitoring System
DBD-ME-025, Revision 1	Radiation Source Terms
DBD-ME-027, Revision 1	Radiological Accident Analysis
DBD-ME-028, Revision 1	Classification of Structures, Systems, and Components
DBD-ME-079, Revision 1	Combustible Gas Control System
DBD-ME-202, Revision 1	Main Steam, Reheat, and Steam Dump System
DBD-ME-203, Revision 1	Feedwater System
DBD-ME-206, Revision 1	Auxiliary Feedwater System
DBD-ME-215, Revision 1	Diesel Generator Fuel Oil Storage and Transfer System
DBD-ME-229, Revision 1	Component Cooling Water System
DBD-ME-232, Revision 1	Containment Spray System
DBD-ME-233, Revision 1	Station Service Water System
DBD-ME-235, Revision 1	Spent Fuel Pool Cooling and Cleanup System
DBD-ME-241, Revision 1	Demineralized and Reactor Makeup Water System

TABLE 5-2

SWEC PROJECT PROCEDURES
APPLICABLE TO THE MECHANICAL PORTION OF THE
CORRECTIVE ACTION PROGRAM (CAP)

PROCEDURE NO.	TITLE
PP-001, Revision 2	Management Plan for Project Quality
PP-003, Revision 0	Preparation, Review, and Approval of Generic Issue Reports (GIRs)
PP-006, Revision 2	Procedure for Processing Corrective Action Requests (CARs)
PP-008, Revision 2	Preparation and Approval of Task Descriptions
PP-009, Revision 2	Preparation and Control of Manual and Computerized Calculations
PP-011, Revision 1	SWEC-CAP/TU Electric Interface
PP-012, Revision 1	Westinghouse Interface
PP-014, Revision 2	SWEC-CAP/Ebasco Interface
PP-015, Revision 2	SWEC-CAP/Impell Interface
PP-019, Revision 2	Change Controls for Licensing Documents
PP-020, Revision 2	Control of Design-Related Project Documents
PP-022, Revision 1	Performing Project Surveillances
PP-023, Revision 5	Processing of Design Change Authorizations (DCAs) and Change Verification Checklists (CVCs)
PP-024, Revision 1	Review of Construction, Quality Control, Startup, and Pre-Operational Procedures
PP-026, Revision 5	Processing of Nonconformance Reports (NCRs), Conditional Release Requests, and Test Deficiency Reports (TDRs)
PP-027, Revision 0	System for Processing Items of Reportability
PP-030, Revision 1	Preparation, Review, and Approval of Design Engineering Packages (DEPs)
PP-031, Revision 0	Preparation and Issuance of Design Modifications

TABLE 5-2
(cont'd)

PROCEDURE NO.	TITLE
PP-032, Revision 3	Preparation, Review, and Approval of SWEC Project Drawings
PP-033, Revision 1	Review of Contractor Specifications
PP-035, Revision 0	Project Training Program
PP-036, Revision 1	Procedure for Computer-Aided Design (CAD) Drawing Conversion
PP-037, Revision 0	Definition of Design Document Classification and Marking of Design Documents
PP-041, Revision 2	Nonconformance Evaluation Procedure
PP-042, Revision 1	SWEC-CAP/PSAS Interface
PP-048, Revision 1	Maintenance of the TU Electric Calculation File
PP-049, Revision 0	Control of Engineering Sketches
PP-050, Revision 2	Preparation of Field Verification Method (FVM) Procedures
PP-053, Revision 2	Review and Approval of Vendor Documents
PP-056, Revision 3	Preparation, Approval, and Issue of Specific Technical Issue Reports (STIRs)
PP-058, Revision 1	Processing of Licensing Correspondence
PP-059, Revision 0	Procedure for Processing of Deficiency Reports (DRs)
PP-063, Revision 0	Specification Procedure and Drawing Update (SPADU) Program
PP-064, Revision 1	Preparing and Documenting Safety Evaluations on Pre-operating License Design Modifications
PP-066, Revision 1	Initiation of Design Modification Requests (DMRs)
PP-067, Revision 1	Resolutions of Discrepancy/Issue Resolution Reports
PP-072, Revision 0	Design Modification ALARA Review
PP-074, Revision 0	Engineering and Design Requirements for ASME-XI Repairs and Replacements/Modifications

TABLE 5-2
(cont'd)

PROCEDURE NO.	TITLE
PP-078, Revision 1	Procedure for Engineering Review of CPSES Equipment/ Materials Storage and Maintenance Requirements
PP-200, Revision 1	CPSES Design Basis Consolidation Program Plan
PP-201, Revision 2	Preparation, Review, and Approval of Design Basis Documents
PP-202, Revision 0	Design Validation Packages (DVPs)
PP-203, Revision 1	Calculation Validation Procedure
PP-204, Revision 2	Drawing/Diagram Validation Procedure
PP-205, Revision 3	Specification Validation Procedure
PP-206, Revision 1	Discrepancy Information Program
PP-208, Revision 0	Post Construction Hardware Validation Program Engineering Evaluations
PP-209, Revision 0	Technical Specification Validation
PP-212, Revision 1	Design Validation Related Documents
PP-214, Revision 1	Component Validation Procedure
PP-215, Revision 0	Preparation, Review, Approval, and Control of Project Status Reports
PP-220, Revision 1	Commodity Attribute Matrix

TABLE 5-3

POST CONSTRUCTION HARDWARE VALIDATION PROGRAM (PCHVP)
MECHANICAL

Construction Work Category	Final Acceptance Attribute	PCHVP Attribute Validation Method
Piping and Inline Components	Component location and orientation	ECE 9.04-05 (Reference 20)
	Material type and grade	ECE 9.04-05
	Nominal pipe size/wall thickness	ECE 9.04-05
	Piping slope requirements	CPE-SWEC-FVM-EE/ME/IC/CS-089 (Reference 31)
	Thread engagement on bolted joints	ECE 9.04-05
	Valve bonnet, strainer body, flanged joint bolt tightness	ECE 9.04-05
	Valve stem orientation	ECE 9.04-05
	Valve motor operator type/orientation	CPE-SWEC-FVM-PS-081 (Reference 36)
	Branch connection type	ECE 9.04-05
	Presence of screwed joint sealant	ECE-9.04-05
	Screwed joint thread engagement	ECE 9.04-05
	Component nameplate data	CPE-SWEC-FVM-EE/ME/IC/CS-089
	Flow element tap orientation	CPE-SWEC-FVM-EE/ME/IC/CS-090 (Reference 30)
	Upstream and downstream dimensions of flow elements	CPE-SWEC-FVM-EE/ME/IC/CS-089
	Pipe wall thickness of pipe bends, bend radius	CPE-SWEC-FVM-PS-081

TABLE 5-3
(cont'd)

Construction Work Category	Final Acceptance Attribute	PCHVP Attribute Validation Method
Piping and Inline Components (Cont'd)	Ovality and buckling	CPE-SWEC-FVM-EE/ME/IC/CS-090
	Expansion joints end-to-end dimensions, axial alignment, shipping tie rods removed, permanent tie rods installed, physical damage, flow direction.	CPE-SWEC-FVM-ME-071 (Reference 32)
	Pipe size eccentric reducer orientation	CPE-SWEC-FVM-EE/ME/IC/CS-089
	Relief valve size and inlet/discharge pipe configuration	CPE-SWEC-FVM-EE/ME/IC/CS-089
	Containment spray nozzle type/orientation	ECE 9.04-05
	Presence of ultrasonic testing (UT) indications in pipe base metal	ECE 9.04-05
	Bolted joint fastener's dielectric kits/gaskets installed	CPE-SWEC-FVM-PS-081
	Dresser couplings installed and location	CPE-SWEC-FVM-ME-071
	Flexible hose installed and location	CPE-SWEC-FVM-ME-077 (Reference 33)
	Valve locking devices installed and location	CPE-SWEC-FVM-EE/ME/CS/IC-089
	Presence of piping and component damage	ECE 9.04-05
	Insulation material type, thickness, jacket material and jet shields location	CPE-SWEC-FVM-EE/ME/IC/CS-089
	Flange/fitting type, Pressure rating, gasket types/material	ECE 9.04-05
	Safety relief valve test gag removed	ECE 9.04-05

TABLE 5-3
(cont'd)

Construction Work Category	Final Acceptance Attribute	PCHVP Attribute Validation Method
Piping and Inline Components (Cont'd)	Presence of arc strikes, butt weld reinforcement, profile, size, undercut, weld spatter, surface defects, nicks, gouges, cracks, fusion	ECE 9.04-05
	Weld deposit and contour for weldolets, sockolets and half couplings.	CPE-SWEC-FVM-EE/ME/IC/CS-090
	Presence of radial weld shrinkage for stainless steel	CPE-SWEC-FVM-PS-090
	Component location/configuration for tornado effects	ECE 9.04-05
Mechanical Equipment	Tank mounting ring location, dimension verification, nozzle type/reinforcement/size/location, presence of damage, shell top angle, internal piping	ECE 9.04-05
	Levelness and bearing, location and configuration, arc strikes, internal/external cleanliness	ECE 9.04-05
	Location and size of tank relief valves, vacuum breakers, rupture disks, or vents	CPE-SWEC-FVM-EE/ME/IC/CS-089
	Compartment radiation source inventory	CPE-SWEC-FVM-EE/ME/IC/CS-089
	Commodity clearance	CPE-SWEC-FVM-CS-68 (Reference 37)
	Tornado blowout panels and dampers identification, size and location, and rollup door free area	CPE-SWEC-FVM-EE/ME/IC/CS-089
	Equipment identification, bolt configuration and tightness, sliding feet clearance	CPE-SWEC-FVM-EE/ME/IC/CS-089

TABLE 5-3
(cont'd)

Construction Work Category	Final Acceptance Attribute	PCHVP Attribute Validation Method
Mechanical Equipment (Cont'd)	Mechanical equipment welds location, offset fairing, fusion overlap, undercut, size, butt weld offset, reinforcement, profile, surface preparation and presence of arc strikes or cracks	ECE 9.04-05
	Component location/configuration for tornado effects	ECE 9.04-05
Mechanical Equipment Supports	Commodity clearance	CPE-SWEC-FVM-CS-068
	Support weld location, fillet size, fusion, length, overlap, porosity, surface slag, undercut, underfilled craters, profiles, presence of arc strikes or cracks	ECE 9.04-05
Mechanical Remote Valve Operators	Valve operator location and size; baseplate bolt hole pattern, attachment location, and size; mounting plate gearbox attachment location	CPE-SWEC-FVM-EE/ME/IC/CS-089
	Valve operator supports tube steel size and length, weld location, length, size, type and thickness	CPE-SWEC-FVM-EE/ME/IC/CS-089
	Component location/configuration for tornado effects	ECE 9.04-05
NF Equipment Supports	Identification, orientation and attachments	CPE-SWEC-FVM-EE/ME/IC/CS-089
	Documentation for NF supports identification, orientation, and weld arc strikes, holes, cracks, craters, fusion, length, porosity, size, surface slag and undercut	ECE 9.04-05
	Bolt engagement	CPE-SWEC-FVM-EE/ME/IC/CS-090

TABLE 5-3
(cont'd)

Construction Work Category	Final Acceptance Attribute	PCHVP Attribute Validation Method
Control Valves	Flow direction	ECE 9.04-05
	Axial orientation	ECE 9.04-05
	Bolting tightness	ECE 9.04-05
	Bolting thread engagement	ECE 9.04-05
	Presence of damage	ECE 9.04-05
	Identification tag number	ECE 9.04-05
	Component location/configuration for tornado effects	ECE 9.04-05
Incore Instrument Tubing	Routing and dimensions	CPE-SWEC-FVM-EE/ME/IC/CS-090
Instrument Flow Elements	Presence of damage	ECE 9.04-05
	Tap location	ECE 9.04-05
	Flow direction, identification-tag number, location	CPE-SWEC-FVM-PS-081
	Tap identification, HP/LP	CPE-SWEC-FVM-IC-069 (Reference 42)
	Component location/configuration for tornado effects	ECE 9.04-05

TABLE 5-4

SUMMARY OF SWEC ENGINEERING ASSURANCE (EA) AUDITS

AUDIT NO.	LOCATION*	DATES OF AUDITS	AUDIT REPORT TRANSMITTAL	AUDIT RESPONSE TRANSMITTAL
Project 1	BOS	01/26/87-03/04/87	IOM-87/077	04/10/87
Site	CP	03/02/87-03/06/87	IOM-87/82	04/14/87
Project 2	BOS/CH	04/27/87-05/22/87	IOM-87/183	07/06/87
Site 2	CP	05/18/87-05/22/87	IOM-87/204	07/13/87
Project 3	BOS	07/20/87-08/28/87	IOM-87/313	10/13/87
Site 3	SITE	11/16/87-11/20/87	IOM-87/521	In Progress

*BOS-Boston Office
CH-Cherry Hill
CP-Comanche Peak Site

TABLE 5-5

SUMMARY OF TU ELECTRIC QUALITY ASSURANCE (QA) AUDITS

AUDIT NO.	LOCATION*	DATES OF AUDITS	AUDIT REPORT TRANSMITTAL	AUDIT RESPONSE TRANSMITTAL
TCP-87-04	CP	02/02/87-03/03/87	QIA-7096	SWTU-1542 SWTU-2580
ATP-87-15	BOS	05/18/87-05/22/87	ATP-7075	SWTU-2485
ATP-87-512	CP	07/13/87-07/31/87	ATP-7248	SWTU-4460 SWTU-3561
ATP-87-21	BOS	06/22/87-06/26/87	ATP-7132	SWTU-3488
ATP-87-37	BOS	08/31/87-09/04/87	ATP-7323	SWTU-4455
TUG-87-10	CP	05/04/87-05/15/87	QIA-7256	RESP NOT REQ'D
TUG-87-27	CP	08/04/87-08/11/87	QIA-7291	SWTU-4102
TCP-87-37	CP	10/12/87-10/21/87	QIA-7394	In Progress
ATP-87-539	CP	11/16/87-12/08/87	In Progress	
ATP-87-538	CP	11/30/87-12/18/87	In Progress	
ATP-87-66	CP	12/14/87-12/18/87	ATP-7638	In Progress

*BOS - BOSTON OFFICE
CP - COMANCHE PEAK SITE

6.0 REFERENCES

1. TU Electric Engineering and Construction Policy No. 1, CPSES Corrective Action Program, Revision 2.

2. TU Electric Letter TXX-6500, W.G. Counsil to U.S. Nuclear Regulatory Commission, Response to Request for Additional Information in Conjunction with Program Plan Update, dated June 25, 1987.

3. TU Electric Letter TXX-6631, W.G. Counsil to U.S. Nuclear Regulatory Commission, Comanche Peak Programs, dated August 20, 1987.

4. SWEC Comanche Peak Project Procedure PP-200, CPSES Design Basis Consolidation Program Plan, Revision 1, January 12, 1988.

5. CPSES Design Basis Document DBD-ME-028, Classification of Structures, Systems and Components, Revision 1.

6. ASME Boiler and Pressure Vessel Code Section III, 1974 Edition through Summer 1974 Addenda.

7. CPSES Design Basis Document DBD-ME-250, Reactor Coolant System, Revision 0.

8. CPSES Design Basis Document DBD-ME-255, Chemical and Volume Control System, Revision 0.

9. CPSES Design Basis Document DBD-ME-258, Boron Recycle System, Revision 0.

10. CPSES Design Basis Document DBD-ME-260, Residual Heat Removal (RHR) System, Revision 0.

11. CPSES Design Basis Document DBD-ME-261, Safety Injection System, Revision 0.

12. CPSES Design Basis Document DBD-ME-264, Liquid Waste System, Revision 0.

13. CPSES Design Basis Document DBD-ME-269, Gaseous Waste System, Revision 0.

14. Westinghouse CPSES Significant Interface Indentification Packages for Reactor Coolant, Chemical and Volume Control, Boron Recycle, Residual Heat Removal, Safety Injection, Liquid Waste and Gaseous Waste Systems.

15. CPSES Design Basis Document DBD-ME-025, Radiation Source Terms, Revision 1.

16. CPSES Design Basis Document DBD-ME-027, Radiological Accident Analysis, Revision 1.

17. CPSES Design Basis Document DBD-ME-008, Containment Analysis, Revision 0.

18. CPSES Design Basis Document DBD-ME-003, Control Room Habitability, Revision 1.

19. NUREG-0582, U.S. Nuclear Regulatory Commission, Water Hammer in Nuclear Power Plants, July 1979.

20. TU Electric ECE-9.04-05, Engineering and Construction Engineering Procedure, Post Construction Hardware Validation Program Engineering Evaluations, Revision 0, September 1, 1987.

21. Comanche Peak Response Team Program Plan and Issue-Specific Action Plans, Appendix D, CPRT Sampling Policy, Applications and Guidelines, Revision 1, January 31, 1986, and Appendix E, Resolution of Discrepancies Identified by the CPRT, Revision 3, June 18, 1987.

22. SWEC Comanche Peak Project Procedure, PP-050, Preparation of Field Verification Method (FVM) Procedures, Revision 2, September 3, 1987.

23. SWEC Topical Report SWSQAP 1-74A, Stone & Webster Engineering Corporation Standard Nuclear Quality Assurance Program, Revision E, February 21, 1987.

24. SWEC Comanche Peak Project Procedure PP-001, "Management Plan for Project Quality", Revision 2, January 6, 1988.

25. SWEC Comanche Peak Project Procedure PP-201, "Preparation, Review and Approval of Design Basis Documents", Revision 2, November 23, 1987.

26. SWEC Comanche Peak Project Procedure PP-203, "Calculation Validation Procedure", Revision 1, August 19, 1987.

27. SWEC Comanche Peak Project Procedure PP-204, "Drawing/Diagram Validation Procedure", Revision 2, September 9, 1987.

28. SWEC Comanche Peak Project Procedure PP-205, "Specification Validation Procedure", Revision 3, December 10, 1987.

29. TU Electric Letter TXX-6676, W.G. Counsil, to U.S. Nuclear Regulatory Commission, Technical Audit Program and Engineering Functional Evaluation, September 8, 1987.

30. Field Verification Method (FVM), PCHVP Quality Control Reinspections, CPE-SWEC-FVM-EE/ME/IC/CS-090, Revision 2, October 15, 1987.

31. Field Verification Method (FVM), PCHVP Engineering Walkdowns, CPE-SWEC-FVM-EE/ME/IC/CS-089, Revision 2, October 15, 1987.

32. Field Verification Method (FVM), To Acquire Data on Safety Related Expansion Joints and Dresser Couplings, CPE-SWEC-FVM-ME-071, Revision 1, August 3, 1987.

33. Field Verification Method (FVM), Verification of Safety-Related Flexible Metal Hose Assemblies, CPE-SWEC-FVM-ME-077, Revision 0, July 23, 1987.

34. Field Verification Method (FVM), Equipment Qualification Walkdowns, CPE-IM-FVM-EQ-057, Revision 2, September 21, 1987.

35. Field Verification Method (FVM), PCHVP Construction/Quality Control Reverifications, CPE-SWEC-FVM-EE/ME/IC/CS-086, Revision 2, October 15, 1987.

36. Field Verification Method (FVM), Hardware Validation and Supplemental Inspection Programs, CPE-SWEC-FVM-PS-081, Revision 0, July 14, 1987.

37. Field Verification Method (FVM), Commodity Clearance, CPE-SWEC-FVM-CS-068, Revision 0, July 30, 1987.

38. Comanche Peak Steam Electric Station Final Safety Analysis Report (FSAR).

39. SWEC Comanche Peak Project Procedure PP-208, Post Construction Hardware Validation Program Engineering Evaluations, Revision 0, December 11, 1987.

40. SWEC Comanche Peak Project Procedure PP-214, Component Validation Procedure, Revision 1, December 23, 1987.

41. SWEC Comanche Peak Project Procedure PP-212, Design Validation Related Documents, Revision 1, December 29, 1987.

42. Field Verification Method (FVM), Safety/Non-safety Related Instrumentation and Tubing Connected to ASME III Fluid Systems and ANSI Safety Class Installations, CPE-SWEC-FVM-IC-069, Revision 1, September 10, 1987.

43. SWEC Comanche Peak Procedure PP-220, Commodity Attribute Matrix, Revision 1, October 15, 1987.

44. NRC Regulatory Guide 1.145, Atmospheric Dispersion Models for Potential Accident Consequence Assessments at Nuclear Power Plants, Revision 1, Reissued February 1983.

APPENDIX A

COMANCHE PEAK RESPONSE TEAM (CPRT) AND EXTERNAL ISSUES

This appendix contains a comprehensive summary of the SWEC evaluation, resolution and corrective and preventive action for all Comanche Peak Response Team (CPRT) and external issues which are related to the mechanical design. Specific references to the design criteria and procedures which have resolved the issues are provided.

To report the resolution of the Comanche Peak Response Team (CPRT) and external issues, an individual subappendix was developed for each issue. Each subappendix includes: a definition of the issue; issue resolution; and corrective and preventive action.

The issues contained in Subappendices A1 through A15 were initially raised by the Comanche Peak Response Team (CPRT)[1,2]. The issues contained in Subappendices A16 through A27 are included in the CYGNA Energy Services (CYGNA) Review Issue List (RIL)[3]. Subappendix A28 is an issue from the Supplemental Safety Evaluation Report No. 10 (SSER 10).

The preventive action is embodied in the procedures and the Design Basis Documents (DBDs) developed and used in the mechanical portion of the Corrective Action Program (CAP). These procedures and the Design Basis Documents (DBDs) have been implemented to resolve all Comanche Peak Response Team (CPRT) and external issues. Implementation of these preventive actions can assure that the mechanical design and hardware for CPSES Unit 1 and Common will continue to comply with the licensing commitments throughout the life of the plant as described in Section 5.4.

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[1]Tenera L. P. (TERA) Mechanical Issue Resolution Reports (IRRs) DAP-E-M-500 through 508 and IRR DAP-E-EIC-503

[2]TU Electric Comanche Peak Response Team Action Plan ISAP VIIc, Revision 0.

[3]CYGNA, "Mechanical Review Issues Lists (RIL) Comanche Peak Steam Electric Station (CPSES) Independent Assessment Program - All Phases", Revision 3, transmitted to TU Electric by CYGNA Energy Services in letter No. 84056.095, dated November 26, 1987.

Comanche Peak Response Team (CPRT) and external issues contained in Appendix A are listed below:

Issue No.	Issue Title
A1	Seismic Qualification of Seismic Category I BOP Equipment and Components
A2	High Energy Line Breaks
A3	Overpressure Protection of Safety-Related Piping and Equipment
A4	Specification of Mechanical Components
A5	Determination of Heat Loads for HVAC Equipment Sizing
A6	Fire Protection
A7	Control of Welding Processes
A8	Internal and Turbine Missile Evaluations
A9	System Design
A10	Environmental Conditions and Requirements
A11	Large Bore Piping Configuration
A12	Small Bore Piping Configuration
A13	Piping Bend Fabrication
A14	Pipe Welds/Material
A15	Mechanical Equipment Installation
A16	CCW System Maximum Temperature
A17	CCW Surge Tank Isolation on High Radiation Signal
A18	Single Failure-RCP Thermal Barrier
A19	Missing Valve Sizing Calculations
A20	CCW Surge Tank Sizing and Design Basis
A21	CCW Pump Motor Sizing
A22	CCW Surge Tank Vent/Relief
A23	CCW Valves HV-4572 and HV-4573 Partial Open Position Setpoint Calculation
A24	Mechanical Equipment Separation Criteria
A25	CCW Pump Discharge Pressure Switch Setpoint Basis
A26	CCW Valves HV-4572 and HV-4574 Inlet Pressure and Shutoff Differential Pressure
A27	Flow Balancing Orifice Sizing Data Transfer
A28	SSER 10 Review

SUBAPPENDIX A1

SEISMIC QUALIFICATION OF SEISMIC CATEGORY I BOP EQUIPMENT AND COMPONENTS (IRR DAP-E-M-500)

The resolution of this issue is addressed in the Equipment Qualification Project Status Report (PSR).

SUBAPPENDIX A2

HIGH ENERGY LINE BREAKS (IRR DAP-E-M-501)

The resolution of this issue is addressed in Supplement A of this Project Status Report (PSR).

SUBAPPENDIX A3

OVERPRESSURE PROTECTION OF SAFETY-RELATED PIPING AND EQUIPMENT (IRR DAP-E-M-502)

1.0 Definition of the Issue

The issue was that instances were found where the original safety-related Balance of Plant (BOP)[1] piping and equipment designs did not meet the ASME Section III Code (Reference 4.2) requirements for protection against overpressure. In addition, component relief and safety valve sizing and pressure setpoints were not fully documented by calculations.

2.0 Issue Resolution

SWEC validated that the safety-related Balance of Plant (BOP) piping and equipment design complies with the requirements of the ASME Section III Code for overpressure protection as follows:

1. Determination of piping and equipment design pressure.

2. Determination that overpressure protection devices were provided wherever required.

3. Performance of new or supplemental calculations for overpressure protection devices, as necessary, to determine the required pressure setpoint, flow and inlet/outlet pipe sizing. The calculations were based on the present design of the piping and the overpressure relief device arrangement.

4. Review of each overpressure protection device setpoint using specific vendor documents to determine that the setpoint is consistent with the design calculations.

Design modifications were developed, as necessary, to comply with the ASME Section III Code requirements. The SWEC calculations were performed in accordance with design control Project Procedure PP-009 (Reference 4.1) which requires that calculations be controlled and documented. Hardware modifications are being implemented.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of these issues.

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[1]Balance of Plant (BOP) consists of all systems, structures and components not designed or supplied as part of the NSSS.

Specific instances related to this issue were determined to be reportable under the provisions of 10CFR50.55(e). It was reported as Significant Deficiency Analysis Reports (SDARs) CP-87-100, Containment Penetration Overpressure Protection in letter number TXX-88110, dated January 20, 1988, and CP-87-28, Condensate Storage Tank Overpressurization in letter number TXX-6992, dated December 2, 1987, and as CP-87-116 on Purge Gas Overpressurization of the Condensate Storage Tank and Reactor Makeup Water Storage Tank in letter number TXX-88004, dated January 13, 1988, from TU Electric to the NRC.

3.1 Corrective Action

SWEC performed calculations to determine overpressure protection device pressure setpoints, flow and inlet/outlet pipe size. The piping and equipment were validated to comply with the ASME Section III Code requirements for overpressure protection. Design modifications were developed as necessary to assure compliance with the ASME Section III Code requirements. The SWEC calculations were performed in accordance with design control Project Procedure PP-009 which requires calculations be controlled and documented.

3.2 Preventive Action

The design criteria have been documented in the Design Basis Documents (DBDs) (References 4.3 through 4.15) which were used as the basis for this review and the preparation of design validation calculations. SWEC design control Project Procedure PP-009 (Reference 4.1) requires that calculations be checked and independently reviewed to assure adequacy and proper documentation retrievability.

4.0 References

4.1 Project Procedure PP-009, Preparation and Control of Manual and Computerized Calculations, Revision 2, August 13, 1987.

4.2 ASME Boiler and Pressure Vessel Code, Section III, 1974 Edition through Summer 1974 Addenda.

4.3 CPSES Design Basis Document DBD-ME-011, Diesel Generator Sets, Revision 1.

4.4 CPSES Design Basis Document DBD-ME-013, Containment Isolation System, Revision 1.

4.5 CPSES Design Basis Document DBD-ME-028 Classification of Structures, Systems, and Components, Revision 1.

4.6 CPSES Design Basis Document DBD-ME-202, Main Steam, Reheat, and Steam Dump System, Revision 1.

4.7 CPSES Design Basis Document DBD-ME-203, Feedwater System, Revision 1.

4.8 CPSES Design Basis Document DBD-ME-206, Auxiliary Feedwater System, Revision 1.

4.9 CPSES Design Basis Document DBD-ME-215, Diesel Generator Fuel Oil Storage and Transfer System, Revision 1.

4.10 CPSES Design Basis Document DBD-ME-229, Component Cooling Water System, Revision 1.

4.11 CPSES Design Basis Document DBD-ME-232, Station Containment Spray System, Revision 1.

4.12 CPSES Design Basis Document DBD-ME-233, Station Service Water System, Revision 1.

4.13 CPSES Design Basis Document DBD-ME-235, Spent Fuel Pool Cooling and Cleanup System, Revision 1.

4.14 CPSES Design Basis Document DBD-ME-241, Demineralized and Reactor Makeup Water System, Revision 1.

4.15 CPSES Design Basis Document DBD-ME-311, Safety Chilled Water System, Revision 1.

SUBAPPENDIX A4

SPECIFICATION OF MECHANICAL COMPONENTS (IRR DAP-E-M-503)

1.0 Definition of the Issue

The issues were as follows:

1.1 Nozzle Loads and Design Conditions

The design pressure, temperature, ambient environment, and load combinations in some component specifications were not consistent with the system design and operating conditions and FSAR commitments. Several component specifications did not document equipment nozzle load data.

1.2 Stainless Steel Welding Requirements

Specification requirements may not have adequately addressed Regulatory Guide 1.44 (Reference 4.46) requirements regarding sensitization of austenitic stainless steel.

Vendor documentation of welding processes for austenitic stainless steel may not have been adequate. Vendor documentation may not have adequately confirmed that the vendor complied with Regulatory Guide 1.31 (Reference 4.47) with regard to material testing for delta ferrite content.

1.3 Material Impact Testing

Applicable specifications may not have adequately addressed the requirements for impact testing of ASME Section III Code (Reference 4.48) Class 2 main steam and feedwater ferritic material and ASME Section III Code Class 1 material in accordance with the ASME Section III Code. Instances were also found where the lowest service temperature as required by the ASME Section III Code was not specified for the testing.

2.0 Issue Resolution

2.1 Nozzle Loads and Design Conditions

SWEC resolved this issue by determining component design pressures, temperatures and load combinations consistent with system design and operating conditions and FSAR commitments. SWEC provided the above design data to SWEC-PSAS and Impell. SWEC-PSAS performed calculations to determine component nozzle loads as described in the Large and Small Bore Piping and Pipe Supports Project Status Reports (PSRs) (References 4.49 and 4.50). SWEC-PSAS provided this nozzle load data to Impell. Impell validated that the nozzle loads were within the design capability of the component as described in the Equipment Qualification Project Status Report (PSR) (Reference 4.51). Impell also

evaluated the effects of ambient environment during the validation of the components. SWEC-PSAS and Impell provided validated design data to SWEC for incorporation into the specifications (References 4.2 through 4.9, 4.18 through 4.20, 4.23 thorugh 4.28, 4.30, and 4.32 through 4.36).

2.2 Stainless Steel Welding Requirements

SWEC has resolved this issue as follows:

- Reviewed safety-related specifications (References 4.5 through 4.8, 4.10 through 4.13, 4.15, 4.17, 4.18, 4.20 through 4.31, 4.34, 4.37 through 4.40 and 4.42 through 4.44) requiring the use of austenitic stainless steel for compliance with the FSAR commitments regarding Regulatory Guide 1.44.

- Reviewed vendor welding procedures to determine extent of compliance with the specification requirements for stainless steel components regarding Regulatory Guide 1.44.

- Reviewed stainless steel filler material certified mill test reports to confirm that the vendor had performed the testing for delta ferrite content in accordance with Regulatory Guide 1.31.

The review of the specifications and vendor documentation demonstrated that there was sufficient welding control and adequate documentation to provide assurance that the production welds did not sensitize the stainless steel base material.

The review of the vendor's filler material certified mill test reports validated vendor compliance with Regulatory Guide 1.31.

2.3 Material Impact Testing

SWEC resolved this issue by reviewing the specifications (References 4.13, 4.14, 4.16, 4.21, 4.31 through 4.34, 4.38 and 4.41) and the vendor documentation regarding impact tests performed by the vendor for ASME Section III Code Class 1 material and Class 2 main steam and feedwater ferritic material to determine the adequacy of impact testing performed, including the test temperatures.

In the case of two specifications (Reference 4.13 and 4.14), vendor documentation was not available. SWEC performed a fracture mechanics analysis of the material in these specifications and validated material adequacy. Based on the review and analyses, SWEC determined that the vendors had complied with the ASME Section III Code requirements, including minimum test temperatures. SWEC revised the appropriate specifications (References 4.13, 4.14 and 4.32) to specify that impact testing be performed in accordance with the ASME Section III Code requirements.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of these issues.

These issues were determined not to be reportable under the provisions of 10CFR50.55(e).

3.1 Corrective Action

3.1.1 Nozzle Loads and Design Conditions

Design conditions have been validated and documented in the applicable calculations performed in accordance with design control Project Procedure PP-009, (Reference 4.1). These design conditions and load combination requirements were provided to SWEC-PSAS and Impell for design validation. SWEC revised the component specifications as necessary (References 4.2 through 4.9, 4.18 through 4.20, 4.23 through 4.28, 4.30 and 4.32 through 4.36) to reflect validated design conditions and load combinations.

3.1.2 Stainless Steel Welding Requirements

No corrective action was required. The specifications (References 4.5 through 4.8, 4.10 through 4.13, 4.15, 4.17, 4.18, 4.20 through 4.31, 4.34, 4.37 through 4.40 and 4.42 through 4.44) contain adequate criteria to require vendor compliance with Regulatory Guides 1.31 and 1.44.

3.1.3 Material Impact Testing

For the specifications, where vendor documentation was not available, SWEC performed a fracture mechanics analysis of the material and validated material adequacy. SWEC revised three component specifications (References 4.13, 4.14 and 4.32) to require vendor compliance with the ASME Section III Code impact testing requirements.

3.2 Preventive Action

3.2.1 Nozzle Loads and Design Conditions

Design calculations document the specific equipment design conditions. SWEC design control Project Procedure PP-009 (Reference 4.1) requires that all calculations be checked and independently reviewed to assure accuracy and proper documentation. Revision of the specifications assures the proper criteria are utilized in future design activities.

3.2.2 Stainless Steel Welding Requirements

The appropriate specifications (References 4.5 through 4.8, 4.10 through 4.13, 4.15, 4.17, 4.18, 4.20 through 4.31, 4.34, 4.37 through 4.40 and 4.42 through 4.44) contain criteria in accordance with Regulatory Guides 1.31 and 1.44 requirements.

3.2.3 Material Impact Testing

Revision of the three specifications (References 4.13, 4.14 and 4.32) results in a set of specifications which conform to the ASME Section III Code impact testing requirements.

4.0 References

4.1 Project Procedure PP-009, Preparation and Control of Manual and Computerized Calculations, Revision 2, August 13, 1987.

4.2 Comanche Peak Specification 2323-MS-7, Auxiliary Feedwater Pumps, Revision 1, May 2, 1975.

4.3 Comanche Peak Specification 2323-MS-10, Service Water Pumps, Revision 3, November 15, 1976.

4.4 Comanche Peak Specification 2323-MS-11, Component Cooling Water Pumps, Revision 2, December 10, 1974.

4.5 Comanche Peak Specification 2323-MS-12, Containment Spray Pumps, Revision 2, April 29, 1975.

4.6 Comanche Peak Specification 2323-MS-13, Spent Fuel Pool Cooling Water Pumps, Revision 1, September 10, 1975.

4.7 Comanche Peak Specification 2323-MS-15A, Reactor Makeup Water Pumps - Nuclear, Revision 0, December 12, 1977.

4.8 Comanche Peak Specification 2323-MS-15B, Safeguards Sump Pumps - Nuclear, Revision 0, November 28, 1977.

4.9 Comanche Peak Specification 2323-MS-15C, Station Service Water Screen Wash Booster Pump and Chilled Water Recirculation Pump - Nuclear, Revision 0, May 4, 1978.

4.10 Comanche Peak Specification 2323-MS-20A, Manual and Self-Actuated Steel Valves 2.0 Inches and Smaller Saunders Diaphragm Type, Revision 2, August 9, 1976.

4.11 Comanche Peak Specification 2323-MS-20A.1, Manual and Self-Actuated Steel Valves 2.0 Inches and Smaller, Revision 2, December 1, 1976.

4.12 Comanche Peak Specification 2323-MS-20B, Manual, Motor Operated, and Self-Actuated Steel Valves 2.5 Inches and Greater, (Saunders Diaphragm Type) Revision 1, December 13, 1975.

4.13 Comanche Peak Specification 2323-MS-20B.1, Manual Power Operated and Self-Actuated Steel Valves 2.5 Inches and Greater, Revision 2, August 12, 1976.

4.14 Comanche Peak Specification 2323-MS-20B.2, Manual and Self-Actuated Steel Valves 2.5 Inches and Greater, Revision 2, August 12, 1976.

4.15 Comanche Peak Specification 2323-MS-20C, Manual and Self-Actuated Butterfly/Wafer Disc Valves, Revision 2, August 9, 1976.

4.16 Comanche Peak Specification 2323-MS-21D.1, Manual Power Operated and Self-Actuated Steel Valves 2.5 Inches and Greater, Revision 1, November 10, 1975.

4.17 Comanche Peak Specification 2323-MS-26, Nuclear Safety and Relief Valves, Revision 3, May 1, 1985.

4.18 Comanche Peak Specification 2323-MS-29A, Strainers - Nuclear, Revision 1, September 7, 1976.

4.19 Comanche Peak Specification 2323-MS-34, Diesel Generators, Revision 1, April 8, 1976.

4.20 Comanche Peak Specification 2323-MS-35, Eductors - Nuclear, Revision 1, March 10, 1978.

4.21 Comanche Peak Specification 2323-MS-43A, Piping-Nuclear (Shop Fabrication of Piping 2 1/2 In. Nominal Diameter and Larger and Piping Material Supply Requirements), Revision 5, July 3, 1984.

4.22 Comanche Peak Specification 2323-MS-43B, Shop Fabrication of Piping in the Field, Revision 5, August 30, 1984.

4.23 Comanche Peak Specification 2323-MS-49, Component Cooling Water Heat Exchangers, Revision 2, August 20, 1974.

4.24 Comanche Peak Specification 2323-MS-50, Containment Spray Heat Exchanger, Revision 3, April 6, 1984.

4.25 Comanche Peak Specification 2323-MS-51, Spent Fuel Pool Heat Exchanger, Revision 2, March 20, 1975.

4.26 Comanche Peak Specification 2323-MS-64, Spent Fuel Pool Demineralizer, Revision 1, June 22, 1976.

4.27 Comanche Peak Specification 2323-MS-65, Shop Fabricated Tanks - Nuclear, Revision 3, November 19, 1976.

4.28 Comanche Peak Specification 2323-MS-67, Field Fabricated Tanks - Nuclear, Revision 1, March 18, 1977.

4.29 Comanche Peak Specification 2323-MS-69A, Valve Isolation Tanks, Revision 2, February 23, 1976.

4.30 Comanche Peak Specification 2323-MS-71A, Expansion Joints - Nuclear, Revision 1, July 7, 1978.

4.31 Comanche Peak Specification 2323-MS-74, Mechanical Penetrations, Revision 0, Addendum No. 5, January 22, 1979.

4.32 Comanche Peak Specification 2323-MS-76, Main Steam Isolation Valves, Revision 2, April 22, 1976.

4.33 Comanche Peak Specification 2323-MS-77, Main Steam Safety Valve, Revision 2, August 2, 1976.

4.34 Comanche Peak Specification 2323-MS-78, Main Steam Relief Valve, Revision 2, June 16, 1976.

4.35 Comanche Peak Specification 2323-MS-80B, Nuclear Safety-Related Centrifugal Water Chillers (NSR), Revision 0, May 17, 1976.

4.36 Comanche Peak Specification 2323-MS-81, Emergency Fan-Coil Unit, Revision 0, October 21, 1975.

4.37 Comanche Peak Specification 2323-MS-82.1, Pneumatically Actuated Butterfly/Deluge Valves, Revision 0, November 8, 1982.

4.38 Comanche Peak Specification 2323-MS-95, Miscellaneous Forgings, Revision 0, November 2, 1978.

4.39 Comanche Peak Specification 2323-MS-100, Piping Erection Specification, Revision 8, July 5, 1984.

4.40 Comanche Peak Specification 2323-MS-160A, Containment Hydrogen Analyzer System, Revision 1, April 1, 1981.

4.41 Comanche Peak Specification 2323-MS-600, Nuclear Safety Class Power Operated Control Valves, Revision 4, February 28, 1980.

4.42 Comanche Peak Specification 2323-MS-603, Process Solenoid Valves, Revision 1, December 1, 1976.

4.43 Comanche Peak Specification 2323-MS-604, Power Operated Diaphragm Valves, Revision 1, November 30, 1976.

4.44 Comanche Peak Specification 2323-MS-624, Flow Elements, Revision 1, November 8, 1976.

4.45 CPSES FSAR, Table 3.9B-1A, Design Load Combinations for ASME Code Class 2 and Class 3 Components (Exclusive of Piping and Piping Supports).

4.46 Regulatory Guide 1.44, Revision 0, May 1973.

4.47 Regulatory Guide 1.31, Revision 3, April 1978.

4.48 ASME Boiler and Pressure Vessel Code Section III, 1974 Edition through Summer 1974 Addenda.

4.49 Large Bore Piping Project Status Report (PSR), Revision 0.

4.50 Small Bore Piping Project Status Report (PSR), Revision 0.

4.51 Equipment Qualification Project Status Report (PSR), Revision 0.

SUBAPPENDIX A5

DETERMINATION OF HEAT LOADS FOR HVAC EQUIPMENT SIZING (IRR DAP-E-M-504)

The resolution of this issue is addressed in the Heating, Ventilation and Air Conditioning (HVAC) Project Status Report (PSR).

SUBAPPENDIX A6

FIRE PROTECTION (IRR DAP-E-EIC-505)

The resolution of this issue is addressed in Supplement B of this Project Status Report (PSR).

SUBAPPENDIX A7

CONTROL OF WELDING PROCESSES (IRR DAP-E-M-506)

1.0 Definition of the Issue

The issue was that specification requirements (References 4.1 through 4.31) may not have adequately addressed Regulatory Guide 1.44 (Reference 4.32) regarding sensitization of austenitic stainless steel.

The issue was also that vendor documentation of welding processes for austenitic stainless steel may not have adequately confirmed that the vendor complied with Regulatory Guide 1.31 (Reference 4.33) with regard to material testing for delta ferrite content.

2.0 Issue Resolution

SWEC has resolved this issue as follows:

- Reviewed safety-related component specifications (Reference 4.1 through 4.31) requiring the use of austenitic stainless steel for compliance to FSAR commitments regarding Regulatory Guide 1.44.

- Reviewed vendor welding procedures to determine extent of compliance to specification requirements for stainless steel components regarding Regulatory Guide 1.44.

- Reviewed stainless steel filler material certified material test reports (CMTRs) to confirm that the vendor had performed the testing of delta ferrite in accordance with Regulatory Guide 1.31.

The review of the specifications and vendor documentation indicated that there was sufficient welding control to provide assurance that the production welds did not sensitize the stainless steel base material.

The review of the vendor stainless steel filler certified material test reports (CMTRs) validated compliance with Regulatory Guide 1.31.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue has been determined not to be reportable under the provisions of 10CFR50.55(e).

3.1 Corrective Action

No corrective action was required. The specifications (References 4.1 through 4.31) contain adequate criteria to require vendor compliance with Regulatory Guides 1.31 and 1.44.

3.2 Preventive Action

The ASME Section III Code specifications (Reference 4.1 through 4.31) contain criteria in accordance with the requirements of Regulatory Guides 1.31 and 1.44 (References 4.32 and 4.33).

4.0 References

4.1 Comanche Peak Specification 2323-MS-12, Containment Spray Pumps, Revision 2, April 29, 1975.

4.2 Comanche Peak Specification 2323-MS-13, Spent Fuel Pool Cooling Water Pumps, Revision 1, September 10, 1975.

4.3 Comanche Peak Specification 2323-MS-15A, Reactor Makeup Water Pumps - Nuclear, Revision 0, December 12, 1977.

4.4 Comanche Peak Specification 2323-MS-15B, Safeguards Sump Pumps - Nuclear, Revision 0, November 28, 1977.

4.5 Comanche Peak Specification 2323-MS-20A, Manual and Self-Actuated Steel Valves 2.0 Inches and Smaller, Saunders Diaphragm Type, Revision 2, August 9, 1976.

4.6 Comanche Peak Specification 2323-MS-20A.1, Manual and Self-Actuated Steel Valves 2.0 Inches and Smaller, Revision 2, December 1, 1976.

4.7 Comanche Peak Specification 2323-MS-20B, Manual Motor Operated, and Self-Actuated Steel Valves 2.5 Inches and Greater (Saunders Diaphram Type), Revision 1, December 13, 1975.

4.8 Comanche Peak Specification 2323-MS-20B.1, Manual, Power-Operated and Self-Actuated Steel Valves 2.5 Inches and Greater, Revision 2, August 12, 1976.

4.9 Comanche Peak Specification 2323-MS-20C, Manual and Self-Actuated Butterfly/Wafer Disc Valves, Revision 2, August 9, 1976.

4.10 Comanche Peak Specification 2323-MS-26, Nuclear Safety and Relief Valves, Revision 3, May 1, 1985.

4.11 Comanche Peak Specification 2323-MS-[illegible]9A, Strainers - Nuclear, Revision 1, September 7, 1976.

4.12 Comanche Peak Specification 2323-[illegible], Eductors - Nuclear, Revision 1, March 10, 1978.

4.13 Comanche Peak Specification 2323-MS-43A, Piping-Nuclear (Shop Fabrication of Piping 2 1/2 Inch Nominal Diameter and Larger and Piping Material Supply Requirements), Revision 5, July 3, 1984.

4.14 Comanche Peak Specification 2323-MS-43B, Shop Fabrication of Piping in the Field, Revision 5, August 30, 1984.

4.15 Comanche Peak Specification 2323-MS-49, Component Cooling Water Heat Exchanger, Revision 2, August 20, 1974.

4.16 Comanche Peak Specification 2323-MS-50, Containment Spray Heat Exchangers, Revision 3, April 6, 1984.

4.17 Comanche Peak Specification 2323-MS-51, Spent Fuel Pool Heat Exchanger, Revision 2, March 20, 1975.

4.18 Comanche Peak Specification 2323-MS-64, Spent Fuel Pool Demineralizer, Revision 1, June 22, 1976.

4.19 Comanche Peak Specification 2323-MS-65, Shop Fabricated Tanks - Nuclear, Revision 3, November 19, 1976.

4.20 Comanche Peak Specification 2323-MS-67, Field Fabricated Tanks - Nuclear, Revision 1, March 18, 1977.

4.21 Comanche Peak Specification 2323-MS-69A, Valve Isolation Tanks, Revision 2, February 23, 1976.

4.22 Comanche Peak Specification 2323-MS-71A, Expansion Joints - Nuclear, Revision 1, July 7, 1978.

4.23 Comanche Peak Specification 2323-MS-74, Mechanical Penetrations, Revision 0, Addendum No. 5, January 22, 1979.

4.24 Comanche Peak Specification 2323-MS-78, Main Steam Relief Valve, Revision 2, June 16, 1976.

4.25 Comanche Peak Specification 2323-MS-82.1, Pneumatically Actuated Butterfly/Deluge Valves, Revision 0, November 8, 1982.

4.26 Comanche Peak Specification 2323-MS-95, Miscellaneous Forgings, Revision 0, November 2, 1978.

4.27 Comanche Peak Specification 2323-MS-100, Piping Erection Specification, Revision 8, July 5, 1984.

4.28 Comanche Peak Specification 2323-MS-160A, Containment Hydrogen Analyzer System, Revision 1, April 1, 1981.

4.29 Comanche Peak Specification 2323-MS-603, Process Solenoid Valves, Revision 1, December 1, 1976.

4.30 Comanche Peak Specification 2323-MS-604, Power-Operated Diaphragm Valves, Revision 1, November 30, 1976.

4.31 Comanche Peak Specification 2323-MS-624, Flow Elements, Revision 1, November 8, 1976.

4.32 Regulatory Guide 1.44, Rev. 0, May, 1973.

4.33 Regulatory Guide 1.31, Rev. 3, April, 1978.

SUBAPPENDIX A8

INTERNAL AND TURBINE MISSILE EVALUATIONS (IRR DAP-E-M-507)

The resolution of this issue is addressed in Supplement A of this Project Status Report (PSR).

SUBAPPENDIX A9

SYSTEM DESIGN (IRR DAP-E-M-508)

1.0 Definition of the Issue

The issues were as follows:

1.1 System Performance Documentation and Analysis

The original design of mechanical systems may not have considered design changes, other related design analyses and appropriate system operating modes. Interfaces with the NSSS vendor and other fluid, control, or electrical systems may not have been completely addressed in changes to the original system design.

1.2 Specification and Evaluation of Component Performance

The specification of safety-related mechanical component design parameters may not have enveloped required system operating modes. The evaluation of vendor documentation may not have considered the performance of the component within the system. Differences between the equipment procurement specification and vendor documentation may not have been completely evaluated against the component sizing calculations.

1.3 Control Functions

The implementation of control features to accomplish the mechanical system functions, to actuate individual components, and to allow for automatic or manual operator capability may not have been addressed in the system design requirements.

1.4 Piping Arrangement

The piping arrangement may not have considered unique system requirements which affect piping design.

1.5 Safety Classification

The nuclear safety class designations of piping and the design of nuclear safety class boundary isolation may not have been correctly determined.

2.0 Resolution of Issue

2.1 System Performance Documentation and Analysis

SWEC resolved this issue by validating that the design of mechanical systems complies with the design criteria specified in the Design Basis Documents (DBDs) (References 4.2 through 4.12). During the design validation of mechanical systems, inter-discipline and interorganizational interfaces were effected in accordance with design validation Project Procedures (References

4.13 through 4.20). Design control Project Procedures (References 4.1, 4.22 through 4.24) require these same interfaces to be accomplished.

2.2 Specification and Evaluation of Component Performance

SWEC resolved this issue by performing calculations to determine mechanical systems design parameters consistent with the design criteria specified in the Design Basis Documents (DBDs) (References 4.2 through 4.12). SWEC validated that the vendor supplied components satisfied the design parameters by comparing the vendor documentation against the calculation results. Design modifications (including component replacement) were developed as necessary to assure that vendor components complied with the mechanical system design criteria. Hardware modifications are being implemented.

2.3 Control Functions

SWEC resolved this issue by validating system and component operating requirements in accordance with the design criteria in the Design Basis Documents (DBDs) (References 4.2 through 4.12). Based on these operating requirements, system instrumentation and component control requirements were established. Calculations were performed to establish instrumentation and control setpoints in accordance with design control Project Procedure PP-009 (Reference 4.1). Validation that the instrumentation and control components are in accordance with these system/component control functions has been accomplished in the Instrumentation & Controls (I&C) Project Status Report (PSR) (Reference 4.21).

2.4 Piping Arrangement

SWEC developed Design Basis Documents (DBDs) (References 4.2 through 4.12) which describe the design criteria, including unique system requirements, for safety-related system/component designs. Based on these criteria, SWEC performed design calculations in accordance with design control Project Procedure PP-009 (Reference 4.1) utilizing piping isometrics which represent the physical piping arrangement. Safety-related flow diagrams and the piping isometrics were reviewed for consistency. For those cases where the as-designed piping arrangement did not adequately meet the design basis, modifications were implemented to bring the piping arrangement into conformance with the design criteria.

2.5 Safety Classification

SWEC developed a Design Basis Document (DBD) (Reference 4.3) which describes the design criteria for nuclear safety classification of CPSES Unit 1 and Common structures, systems and components. Using the Design Basis Document (DBD) criteria, SWEC reviewed the nuclear safety classification of system piping and components and the design arrangement of nuclear safety class boundary isolation

features. Any items not in conformance with design basis criteria were modified. Hardware modifications are being implemented.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of these issues.

Specific instances related to this issue were determined to be reportable under the provisions of 10CFR50.55(e). These issues were reported as the following Significant Deficiency Analysis Reports (SDARs) and reported to the NRC from TU Electric in the letters listed below:

SDAR CP-86-018	Safety Chilled Water Chiller Units	TXX-88103, dated January 18, 1988
SDAR CP-87-026	Diesel Generator Fuel Oil Transfer Pump Suction Lift	TXX-88106, dated January 20, 1988
SDAR CP-87-055	Containment Spray Pump Recirculation Piping	TXX-88108, dated January 18, 1988
SDAR CP-87-108	Auxiliary Feedwater Pump Low Suction Trips	TXX-88112, dated January 18, 1988
SDAR CP-87-130	Service Water System Water Hammer	TXX-88034, dated January 6, 1988

3.1 Corrective Action

SWEC established system and component operating requirements, documented these requirements, and validated that these requirements were correctly input to the system/component designs. Modifications to system and component designs were developed as necessary to validate the design criteria. Hardware modifications are being implemented.

3.2 Preventive Action

The design criteria have been documented in the Design Basis Documents (DBDs) (References 4.2 through 4.12) which were used as the basis for the design validation calculations. SWEC design control Project Procedure PP-009 (Reference 4.1) requires that all calculations be checked and independently reviewed to assure accuracy and that the calculation documentation is properly controlled. SWEC design control Project Procedures (References 4.1, 4.22 through 4.24) assure that the appropriate system evaluation and interdiscipline review is accomplished for design changes.

4.0 References

4.1 Project Procedure PP-009, Preparation and Control of Manual and Computerized Calculations, Revision 2, dated August 13, 1987.

4.2 CPSES Design Basis Document DBD-ME-013, Containment Isolation System, Revision 1.

4.3 CPSES Design Basis Document DBD-ME-028, Classification of Structures, Systems and Components, Revision 1.

4.4 CPSES Design Basis Document DBD-ME-202, Main Steam, Reheat, and Steam Dump System, Revision 1.

4.5 CPSES Design Basis Document DBD-ME-203, Feedwater System, Revision 1.

4.6 CPSES Design Basis Document DBD-ME-206, Auxiliary Feedwater System, Revision 1.

4.7 CPSES Design Basis Document DBD-ME-215, Diesel Generator Fuel Oil Storage and Transfer System, Revision 1.

4.8 CPSES Design Basis Document DBD-ME-229, Component Cooling Water System, Revision 1.

4.9 CPSES Design Basis Document DBD-ME-232, Containment Spray System, Revision 1.

4.10 CPSES Design Basis Document DBD-ME-233, Station Service Water System, Revision 1.

4.11 CPSES Design Basis Document DBD-ME-235, Spent Fuel Pool Cooling and Cleanup System, Revision 1.

4.12 CPSES Design Basis Document DBD-ME-241, Demineralized and Reactor Makeup Water System, Revision 1.

4.13 Project Procedure PP-201, Preparation, Review and Approval of Design Basis Documents, Revision 2, November 23, 1987.

4.14 Project Procedure PP-202, Design Validation Packages (DVPs), Revision 0, August 10, 1987.

4.15 Project Procedure PP-203, Calculation Validation Procedure, Revision 1, August 19, 1987.

4.16 Project Procedure PP-204, Drawing/Diagram Validation Procedure, Revision 2, September 9, 1987.

4.17 Project Procedure PP-205, Specification Validation Procedure, Revision 3, December 10, 1987.

4.18 Project Procedure PP-212, Design Validation Related Documents, Revision 1, December 29, 1987.

4.19 Project Procedure PP-214, Component Validation Procedure, Revision 1, December 23, 1987.

4.20 CPSES Task Description, System Design Interfaces.

4.21 Instrumentation & Controls Project Status Report, Revision 0.

4.22 Project Procedure PP-023, Processing of Design Change Authorizations (DCAs) and Change Verification Checklists (CVCs), Revision 5, January 4, 1988.

4.23 Project Procedure PP-031, Preparation and Issuance of Design Modifications, Revision 0, May 19, 1987.

4.24 Project Procedure PP-066, Initiation of Design Modification Requests (DMRs), Revision 1, August 19, 1987.

SUBAPPENDIX A10

ENVIRONMENTAL CONDITIONS AND REQUIREMENTS (IRR DAP-E-EIC-503)

1.0 Definition of the Issue

The issues were as follows:

1.1 Inadequate calculations existed for determining the CPSES Unit 1 containment accident environments for pressure, temperature, relative humidity, chemical spray and flooding.

1.2 Inadequate calculations existed for determining the radiation environments.

2.0 Issue Resolution

The issues were resolved as follows:

2.1 The following design and procedural modifications were developed:

- System changes to the containment spray chemical additive system to provide caustic addition to the containment spray pumps assuming single failure.
- Emergency Response Guide (ERG) changes to include operator action to isolate the chemical addition tank during the switchover from injection to cold leg recirculation, during containment spray.
- Door modifications to allow water to flow into adjoining areas of the containment to reduce accident maximum containment flood level.

These modifications are being implemented.

New calculations were performed by SWEC in accordance with design criteria as specified in Design Basis Documents (DBD) (References 4.2 and 4.4) to develop the containment pressure, temperature, relative humidity, chemical spray accident environment and the containment maximum flood level. The SWEC calculations were performed in accordance with design control Project Procedure PP-009 (Reference 4.1) which requires that calculations be controlled and documented. These calculations, in conjunction with the above modifications, validate that the containment accident environments for pressure, temperature, relative humidity, chemical spray and flooding comply with the design criteria as specified in the Design Basis Documents (DBDs) (References 4.2, 4.3, 4.4 and 4.5).

2.2 New calculations were performed by SWEC in accordance with the design criteria as specified in the Design Basis Documents (DBDs) (References 4.4 and 4.5) to develop the radiation environments for

equipment qualification. The SWEC calculations were performed in accordance with design control Project Procedure PP-009 (Reference 4.1) which requires that calculations be controlled and documented.

3.0 Corrective and Preventive Action

3.1 Corrective Action

No additional issues were identified during the review and resolution of these issues.

These issues were determined to be reportable under the provisions of 10CFR50.55(e). These issues were reported as the following Significant Deficiency Analysis Reports (SDARs) and reported to the NRC by TU Electric in the letters listed below:

SDAR CP-87-129 Containment Spray System pH, letter number TXX-88113, dated January 19, 1988

SDAR CP-87-115 Containment Maximum Flood Level, letter number TXX-88115, dated January 18, 1988

3.1.1 SWEC performed calculations to determine the containment pressure, temperature, relative humidity, chemical spray accident environments and the maximum containment flood level. The calculations were based on the design modifications described above. The SWEC calculations were performed in accordance with design control Project Procedure PP-009 (Reference 4.1) which requires calculations be controlled and documented. These calculations indicated that design and procedural modifications were required. These modifications are identified in Section 2.1 and are being implemented.

The equipment qualification portion of the Corrective Action Program (CAP) used these parameters for equipment qualification.

3.1.2 SWEC performed calculations to determine the radiation environments for equipment qualification. The SWEC calculations were performed in accordance with design control Project Procedure PP-009 (Reference 4.1) which requires calculations to be controlled and documented.

The equipment qualification portion of the Corrective Action Program (CAP) used these parameters for equipment qualification.

3.2 Preventive Action

3.2.1 The design criteria have been documented in the Design Basis Documents (DBDs) (References 4.2, 4.3 & 4.4) and were used as the basis for the design validation analysis. SWEC design control Project Procedure PP-009 (Reference 4.1) requires that all calculations be checked and independently reviewed to assure accuracy and that the calculation documentation is properly controlled.

3.2.2 The design criteria have been documented in the Design Basis Documents (DBDs) (References 4.4 and 4.5) which were used as the basis for this review and the preparation, control and issue of design validation calculations. SWEC design control Project Procedure PP-009 (Reference 4.1) requires that calculations be checked and independently reviewed to assure accuracy and that the calculation documentation is properly controlled.

4.0 References

4.1 Project Procedure PP-009, Preparation and Control of Manual and Computerized Calculations, Revision 2, August 13, 1987

4.2 CPSES Design Basis Document DBD-ME-008, Containment Analysis, Revision 0

4.3 CPSES Design Basis Document DBD-ME-232, Containment Spray System, Revision 1

4.4 CPSES Design Basis Document DBD-ME-076, Postulated Environments for Equipment Qualification, Revision 1

4.5 CPSES Design Basis Document DBD-ME-025, Radiation Source Terms, Revision 1

SUBAPPENDIX A11

LARGE BORE PIPING CONFIGURATION (ISAP VIIc, APPENDIX 8)

1.0 Definition of the Issue

The issues were as follows:

1.1 Component Alignment

One flow element was found to be installed opposite to the flow direction specified on the piping isometric drawing.

1.2 Piping Clearances

There were instances where the clearances between the large bore pipes and other structures were not as specified in the installation specification. In one instance there was not sufficient clearance to allow for design piping movements.

1.3 Installation Requirements

In one instance the tie rods on an expansion joint were found to be missing the required locking/jam nut.

2.0 Issue Resolution

The issue was resolved as follows:

2.1 Component Alignment

The improper installation of the flow element was corrected. Safety-related flow diagrams were reviewed and safety-related flow elements were identified. The large bore piping isometrics were reviewed for compliance with the flow diagrams. An inspection of flow elements utilizing these isometrics is being conducted as part of the Post Construction Hardware Validation Program (PCHVP) to assure installation in accordance with design requirements.

2.2 Piping Clearances

A specification (Reference 4.3) has been developed and issued which specifies piping clearance requirements. An engineering walkdown of large bore piping is being conducted as part of the Post Construction Hardware Validation Program (PCHVP) to assure that clearances are in accordance with specification requirements.

..3 Installation Requirements

An inspection of safety-related expansion joints is being conducted as part of the Post Construction Hardware Validation Program (PCHVP) to assure installation in accordance with vendor requirements and design criteria. The specific expansion joint with the identified deviation was deleted from the Service Water System, based on pipe stress analysis which demonstrated that it was not needed.

3.0 Corrective and Preventive Action

No additional issues were identified during review and resolution of this issue.

This issue was determined not to be reportable under the provisions of 10CFR50.55(e).

3.1 Corrective Action

3.1.1 Component Alignment

The improper installation of the flow element was corrected. A comparison of the flow diagrams and large bore piping isometric drawings was made to assure that the direction of flow through safety-related flow elements was correctly identified. Field Verification Methods (FVMs) (References 4.5, 4.6, and 4.12) have been developed as part of the Post Construction Hardware Validation Program (PCHVP) to assure that the installation of flow elements is in compliance with the specifications, piping isometrics and vendor requirements.

3.1.2 Piping Clearances

A specification (Reference 4.3) was developed to identify specific clearance requirements for components. A Field Verification Method (FVM) (Reference 4.4) was developed to document the acceptability of piping clearances during the Post Construction Hardware Validation Program (PCHVP).

3.1.3 Installation Requirements

A Field Verification Method (FVM) (Reference 4.2) was developed to document the physical installation of safety-related piping expansion joints. Implementation of this FVM assures that the installation is in accordance with the requirements of the specifications and vendor requirements.

3.2 Preventive Action

3.2.1 Component Alignment

SWEC revised the installation specification (Reference 4.1) to assure appropriate attributes for installation and inspection were included. SWEC also identified revisions to the construction and Quality Control (QC) procedures (References 4.9 and 4.10). These procedures have been revised to be in accordance with the installation specification. Piping isometrics have been revised to reflect accurate flow direction markings.

3.2.2 Piping Clearances

SWEC has issued the commodity clearance specification (Reference 4.3) and installation specification (Reference 4.1) as criteria for future installations. SWEC identified revisions to the construction procedure for piping (Reference 4.7) which included commodity clearance requirements (Reference 4.3). The construction procedure has been revised to invoke the requirements of the commodity clearance specification.

3.2.3 Installation Requirements

The installation specification (Reference 4.1) was revised to include specific attributes for installation, verification and maintenance of expansion joints. SWEC identified revisions to the construction and Quality Control (QC) procedures (References 4.8, 4.9 and 4.11) which include specific instructions concerning the installation and acceptance of expansion joints. These procedures have been revised and are being used for installation activities.

4.0 References

4.1 Comanche Peak Specification 2323-MS-100, Field Fabrication and Erection of Piping and Pipe Supports, Revision 9, July 9, 1987.

4.2 Field Verification Method (FVM), To Acquire Data on Safety Related Expansion Joints and Dresser Couplings, CPE-SWEC-FVM-ME-071, Revision 1, August 3, 1987.

4.3 Comanche Peak Specification CPES-S-1021, Commodity Clearance, Revision 0, June 5, 1987.

4.4 Field Verification Method (FVM), Commodity Clearance, CPE-SWEC-FVM-CS-068, Revision 0, dated July 30, 1987.

4.5 Field Verification Method (FVM), Post Construction Hardware Validation Program Quality Control Reinspections, CPE-SWEC-FVM-EE/ME/IC/CS-090, Revision 2, October 15, 1987.

4.6 Field Verification Method (FVM), Post Construction Hardware Validation Program Engineering Walkdowns, CPE-SWEC-FVM-EE/ME/IC/CS-089, Revision 2, October 15, 1987.

4.7 Construction Procedure CP-CPM-6.2, Clearance Criteria, Revision 1, August 31, 1987.

4.8 Quality Assurance Procedure QI-QAP-11.1-28, Fabrication and Installation, Inspection of Safety Class Component Supports, Revision 34, November 20, 1987.

4.9 Construction Procedure CP-CPM-6.9E, Pipe Fabrication and Installation, Appendix E, Revision 10, August 31, 1987.

4.10 Quality Assurance Procedure QI-QAP-11.1-26, Pipe Fabrication and Equipment Installation Inspections, Revision 18, November 20, 1985.

4.11 ASME Quality Procedure AQP 11.2, Fabrication and Installation Inspection of Pipe and Equipment, Revision 2, November 16, 1987.

4.12 Field Verification Method (FVM), Hardware Validation and Supplemental Inspection Programs, CPE-SWEC-FVM-PS-081, Revision 0, July 14, 1987.

SUBAPPENDIX A12

SMALL BORE PIPING CONFIGURATION (ISAP VIIc, APPENDIX 9)

1.0 Definition of the Issue

The issues were as follows:

1.1 Component Alignment

One globe valve was found to be installed opposite to the flow direction recommended by the valve vendor.

1.2 Piping Clearances

There were numerous instances where the small bore pipe clearances were not as specified in the design specification.

2.0 Issue Resolution

The issues were resolved as follows:

2.1 Component Alignment

The original installation of the globe valve was evaluated by engineering and found to be acceptable. This valve is used as a drain valve from a process fluid pipe. Flow direction of the valve for this installation is not critical to the service condition. Safety-related small bore piping isometrics were reviewed for compliance with the flow diagrams. An inspection of valves utilizing these isometrics is being conducted as part of the Post Construction Hardware Validation Program (PCHVP) to assure installation in accordance with design requirements.

2.2 Piping Clearances

A specification (Reference 4.2) has been developed and issued which specifies piping clearance requirements. An engineering walkdown of small bore piping is being conducted as part of the Post Construction Hardware Validation Program (PCHVP) to assure clearances are in accordance with specification requirements.

3.0 Corrective and Preventive Action

No additional issues were identified during review and resolution of this issue.

This issue has been determined not to be reportable under the provisions of 10CFR50.55(e).

3.1 Corrective Action

3.1.1 Component Alignment

The original installation of the valve was satisfactory. A comparison of the flow diagrams and small bore piping isometric drawings has been made to assure that the direction of flow through safety-related valves is correctly identified. Field Verification Methods (FVMs) (References 4.3, 4.4 and 4.9) will document the orientation of valves as part of the Post Construction Hardware Validation Program (PCHVP) to assure that installation is in compliance with the specifications, piping isometrics and vendor requirements.

3.1.2 Piping Clearances

A specification (Reference 4.2) was developed to identify specific clearance requirements for components. A Field Verification Method (FVM) (Reference 4.6) was developed to document the physical installation during the Post Construction Hardware Validation Program (PCHVP).

3.2 Preventive Action

3.2.1 Component Alignment

SWEC revised the installation specification (Reference 4.1) to assure appropriate attributes for installation and inspection were included. SWEC also identified revisions to the construction and Quality Control (QC) procedures (References 4.5 and 4.7). These procedures have been revised to be in accordance with the installation specification requirements.

3.2.2 Piping Clearances

SWEC has developed the commodity clearance specification (Reference 4.2) and installation specification (Reference 4.1). SWEC identified revisions to the construction Procedure (Reference 4.8). This procedure has been revised to reflect the commodity clearance specification requirements.

4.0 References

4.1 Comanche Peak Specification 2323-MS-100, Field Fabrication and Erection of Piping and Pipe Supports, Revision 9, July 9, 1987

4.2 Comanche Peak Specification CPES-S-1021, Commodity Clearance, Revision 0, June 5, 1987

4.3 Field Verification Method (FVM), Post Construction Hardware Validation Program Quality Control Reinspections, CPE-FVM-EE/ME/IC/CS-090, Revision 2, October 15, 1987

4.4 Field Verification Method (FVM), Post Construction Hardware Validation Program Engineering Walkdowns, CPE-FVM-EE/ME/IC/CS-089, Revision 2, October 15, 1987

4.5 Construction Procedure CP-CPM-6.9E, Appendix E, Pipe Fabrication and Installation, Revision 10, August 31, 1987

4.6 Field Verification Method (FVM), Commodity Clearance, CPE-SWEC-FVM-CS-068, Revision 0, July 30, 1987

4.7 Quality Assurance Procedure QI-QAP-11.1-26, Pipe Fabrication and Equipment Installation Inspections, Revision 18, November 20, 1985

4.8 Construction Procedure CP-CPM-6.2, Clearance Criteria, Revision 1, August 31, 1987

4.9 Field Verification Method (FVM), Hardware Validation and Supplemental Inspection Programs, CPE-SWEC-FVM-PS-081, Revision 0, July 14, 1987

SUBAPPENDIX A13

PIPING BEND FABRICATION (ISAP VIIc APPENDIX 10)

1.0 Definition of the Issue

The issue was that the pipe bending procedure could cause thinning of the pipe wall thickness to less than ASME Section III Code requirements (Reference 4.4).

2.0 Issue Resolution

All safety-related pipe bends performed at CPSES are being inspected to verify acceptable minimum post-bend wall thickness using walkdowns and ultrasonic testing conducted under a Field Verification Method (FVM) (Reference 4.5) as part of the Post Construction Hardware Validation Program (PCHVP). Any pipe bends found to violate minimum wall thickness requirements will be documented and dispositioned using Non-conformance Reports.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue has been determined not to be reportable under the provisions of 10CFR50.55(e).

3.1 Corrective Action

To date, approximately 208 pipe bends have been ultrasonically tested. All but five pipe bends tested meet manufacturer's minimum pipe wall thickness requirements. Nonconformance reports were prepared for these five pipe bends. Stress analyses of the identified manufacturer's minimum wall bend violations were performed and determined that the violations had no adverse impact on the pipe. Wall thickness calculations based upon system pressure/temperature were also performed and found to be satisfactory. Based upon these calculations, it was concluded that the structural integrity and pressure retaining capacity of the pipe is satisfactory.

A Quality Control (QC) procedure (Reference 4.3) has been developed as part of the Post Construction Hardware Validation Program (PCHVP) to perform an inspection of the wall thickness of the pipe bends in conjunction with walkdowns and testing (Reference 4.5). For any bend which does not comply with the ASME Section III Code minimum wall thickness, the pipe bend section will be removed and replaced using the appropriate construction procedures (Reference 4.2) and installation specifications (Reference 4.1).

3.2 Preventive Action

The piping installation specification (Reference 4.1), construction procedure (Reference 4.2) and Quality Control (QC) inspection procedure (Reference 4.3) have been revised to add the requirement that the minimum wall thickness be met after bending and that the necessary documentation be provided.

4.0 References

4.1 Comanche Peak Specification 2323-MS-100, Field Fabrication and Erection of Piping and Pipe Supports, Revision 9, July 9, 1987.

4.2 Comanche Peak Construction Procedure CP-CPM-6.9E, Pipe Fabrication and Installation, Revision 10, August 31, 1987.

4.3 Quality Control Procedure CP-QAP-12.1, Mechanical Component Installation Verification, Revision 21, November 16, 1987.

4.4 ASME Boiler and Pressure Vessel Code Section III, 1974 Edition through Summer 1974 Addenda.

4.5 Field Verification Method (FVM), Hardware Validation and Supplemental Inspection Programs, CPE-SWEC-FVM-PS-081, Revision 0, July 14, 1987.

SUBAPPENDIX A14

PIPE WELDS/MATERIAL
(ISAP VIIc, APPENDIX 12)

1.0 Definition of the Issue

The issue was that the pipe welding and material may have caused excessive radial weld shrinkage on circumferential pipe welds of thin wall stainless steel pipes.

2.0 Issue Resolution

SWEC resolved this issue by validating that the installation specification contains criteria to prevent excessive radial weld shrinkage and provides acceptance/rejection criteria for inspection. Using a Field Verification Method (FVM) (Reference 4.3), an inspection of applicable welds for radial weld shrinkage is being performed as part of the Post Construction Hardware Validation Program (PCHVP).

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

The issue was determined not to be reportable under the provisions of 10CFR50.55(e).

3.1 Corrective Action

The installation specification (Reference 4.1) was validated for inclusion of criteria to prevent excessive radial weld shrinkage. A Field Verification Method (FVM) (Reference 4.3) was developed by SWEC for use in the Post Construction Hardware Validation Program (PCHVP) and is being used to inspect applicable welds for radial weld shrinkage.

3.2 Preventive Action

SWEC identified revisions to the Quality Control (QC) procedures (Reference 4.2 and 4.4). These procedures were revised to be in accordance with the installation specification. The installation specification (Reference 4.1) and the revised Quality Control (QC) inspection procedures (References 4.2 and 4.4) provide criteria to prevent recurrence during present and future construction activities.

4.0 References

4.1 Comanche Peak Specification 2323-MS-100, Field Fabrication and Erection of Piping and Pipe Supports, Revision 9, July 9, 1987.

4.2 Quality Control Procedure CP-QAP-12.1, Mechanical Component Installation Verification, Revision 21, November 16, 1987.

4.3 Field Verification Method, Post Construction Hardware Validation Program Quality Control Reinspections, CPE-SWEC-FVM-EE/ME/IC/CS-090, Revision 2, October 15, 1987.

4.4 ASME Quality Procedure, AQP 11.2, Fabrication and Installation Inspection of Pipe and Equipment, Revision 2, November 16, 1987.

SUBAPPENDIX A15

MECHANICAL EQUIPMENT INSTALLATION
(ISAP VIIc, APPENDIX 17)

1.0 Definition of the Issue

The issues were as follows:

1.1 Broken Hold-Down Bolts

Two hold-down bolts on the control room air conditioner compressor were broken.

1.2 Bolt Torquing

Approximately 1/2 of the bolts/nuts holding the manway cover on the pressurizer, steam generators and a safety injection tank were found to be loose.

2.0 Issue Resolution

The issues were resolved as follows:

2.1 Broken Hold-Down Bolts

SWEC resolved this issue by developing a list of rotating equipment which had exhibited excessive vibration during testing. Impell is inspecting the bolting of these components and is evaluating their adequacy as part of the equipment qualification Corrective Action Program (CAP) as described in the Equipment Qualification Project Status Report (PSR) (Reference 4.3). These inspections and evaluations are part of the overall CPSES Unit 1 and Common Post Construction Hardware Validation Program (PCHVP). Bolting which is not adequate will be replaced.

2.2 Bolt Torquing

The pressurizer and steam generator manways were redesigned to utilize studs, nuts and washers which were installed in accordance with practices outlined in revised NSSS specified requirements. The bolting on the safety injection tank manway was reworked in accordance with the NSSS specified requirements. The Post Construction Hardware Validation Program (PCHVP) is being implemented to inspect safety-related manway bolting on the secondary side of the Steam Generator.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of these issues.

These issues have been determined not to be reportable under the provisions of 10CFR50.55(e).

3.1 Corrective Action

3.1.1 Broken Hold-Down Bolts

A Field Verification Method (FVM) (Reference 4.2) was developed by Impell to perform equipment hold-down bolt inspections as part of the Post Construction Hardware Validation Program (PCHVP). Any broken hold-down bolts will be replaced as required.

3.1.2 Bolt Torquing

The pressurizer and steam generator (primary side) manway covers and the safety injection tank bolting has been corrected in accordance with the NSSS specified requirements. In addition, SWEC developed Field Verification Method (FVM) (Reference 4.1) which is being used in the Post Construction Hardware Validation Program (PCHVP) to assure that safety-related manway bolting on the steam generator (secondary side) is in accordance with vendor documentation.

3.2 Preventive Action

3.2.1 Broken Hold-Down Bolts

The Post Construction Hardware Validation Program (PCHVP) and associated engineering evaluations is validating the as-built hardware conformance to the validated design basis. The Impell equipment qualification program evaluates equipment bolting as part of the validation described in its Project Status Report (PSR) (Reference 4.3), thus assuring adequate anchorage of all mechanical equipment.

3.2.2 Bolt Torquing

For the steam generators, pressurizer and safety injection tanks, the NSSS documentation has been updated to show the revised bolting requirements.

4.0 References

4.1 Field Verification Method (FVM) Post Construction Hardware Validation Program Construction/Quality Control Reverifications, CPE-SWEC-FVM-EE/ME/IC/CS-086 Revision 2, October 15, 1987.

4.2 Field Verification Method (FVM) Rotating/Reciprocating Equipment Anchorage Walkdown, CPE-IM-FVM-EQ-103, Revision 0, September 1, 1987.

4.3 Equipment Qualification Project Status Report (PSR), Revision 0.

SUBAPPENDIX A16

COMPONENT COOLING WATER SYSTEM MAXIMUM TEMPERATURE (CYGNA RIL No. M-1)

1.0 Definition of the Issue

The issue was that the design of Component Cooling Water (CCW) System components may have been affected by later increases in the system maximum temperature. Conflicting design documentation existed with different temperatures for the same system and components.

2.0 Issue Resolution

The Component Cooling Water (CCW) Design Basis Document (DBD) (Reference 4.2) contains the design criteria for the system/component designs. SWEC prepared new design calculations in accordance with design control Project Procedure PP-009, (Reference 4.1) to document the system maximum temperature. The results of these calculations (maximum temperature) were used to validate that the individual Component Cooling Water (CCW) components were designed for this temperature. All components were shown to meet the validated maximum system temperature.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue has been determined not to be reportable under the provisions of 10CFR50.55(e).

3.1 Corrective Action

The results of the review described above showed that the design of the existing system components met the system maximum temperatures. The new SWEC design calculations and the Component Cooling Water (CCW) Design Basis Document (DBD) (Reference 4.2) provides consistent design documentation for the system.

3.2 Preventive Action

The design criteria have been documented in the Component Cooling Water (CCW) System Design Basis Document (DBD) (Reference 4.2) which was used as the basis for the design validation calculations. SWEC design control Project Procedure PP-009 (Reference 4.1) requires that all calculations be checked and independently reviewed to assure accuracy and that the calculation documentation is properly controlled.

4.0 References

4.1 Project Procedure PP-009, Preparation and Control of Manual and Computerized Calculations, Revision 2, August 13, 1987.

4.2 DBD-ME-229, Component Cooling Water System, Revision 1.

SUBAPPENDIX A17

COMPONENT COOLING WATER SURGE TANK ISOLATION ON HIGH RADIATION SIGNAL (CYGNA RIL NO. M-2)

1.0 Definition of the Issue

The issue was whether adequate review of related radiological analyses was done when automatic isolation of the Component Cooling Water (CCW) surge tank vent line was removed. Automatic isolation of the vent line had previously been actuated by a high radiation signal.

2.0 Issue Resolution

SWEC calculated the maximum vent line discharge from the surge tank based on the system design criteria and operating modes specified in the Component Cooling Water (CCW) Design Basis Document (DBD) (Reference 4.1). Based on this maximum surge tank vent line discharge, SWEC calculated the postulated radiological releases. These postulated radiological releases were within the applicable limits stated in the FSAR (Reference 4.3).

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue has been determined not to be reportable under the provisions of 10CFR50.55(e).

3.1 Corrective Action

Calculations documenting the maximum Component Cooling Water (CCW) surge tank vent line discharge and postulated radiological releases were completed in accordance with the criteria contained in the Design Basis Document (DBD) (Reference 4.1).

3.2 Preventive Action

The design criteria have been documented in the Component Cooling Water (CCW) System Design Basis Document (DBD) (Reference 4.1) which was used as the basis for the design validation calculations. SWEC design control Project Procedure PP-009 (Reference 4.2) requires that all calculations be checked and independently reviewed to assure accuracy and that the calculation documentation is properly controlled. SWEC design control Project Procedures PP-023, PP-031, and PP-066 (References 4.4 through 4.6) assure that the appropriate system evaluation and interdiscipline review is accomplished for design changes.

4.0 References

4.1 CPSES Design Basis Document DBD-ME-229, Component Cooling Water System, Revision 1.

4.2 Project Procedure PP-009, Preparation and Control of Manual and Computerized Calculations, Revision 2, August 13, 1987.

4.3 Section 15.6.2, CPSES FSAR.

4.4 Project Procedure PP-023, Processing of Design Change Authorizations (DCAs) and Change Verification Checklists (CVCs), Revision 5, January 4, 1988.

4.5 Project Procedure PP-031, Preparation and Issuance of Design Modifications, Revision 0, May 19, 1987.

4.6 Project Procedure PP-066, Initiation of Design Modification Requests (DMRs), Revision 1, August 19, 1987.

SUBAPPENDIX A18

SINGLE FAILURE - REACTOR COOLANT PUMP (RCP) THERMAL BARRIER (CYGNA RIL No. M-5)

1.0 Definition of the Issue

The issue was that the low pressure portions of the Component Cooling Water (CCW) System could be overpressurized and reactor coolant could be released outside containment if the isolation valve on the outlet of the Reactor Coolant Pump (RCP) thermal barrier fails to close subsequent to a rupture of the thermal barrier.

2.0 Issue Resolution

This issue was resolved by developing the following design modifications:

- Instrumentation changes to provide positive means to sense a thermal barrier rupture.
- Addition of a second ASME Section III Code check valve upstream of each thermal barrier to meet the single failure criterion.
- Replacement of a flow transmitter orifice plate with an orifice plate which can withstand the resulting pressure differential.

These modifications are being implemented.

A radiological analysis was performed based on the above modifications, which confirmed that the postulated radiological release due to this event is within the radiological limits stated in the FSAR (Reference 4.3). An additional analysis determined that the system piping and piping components could withstand the pressure resulting from this event.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue was determined to be reportable under the provisions of 10CFR50.55(e). It was reported as Significant Deficiency Analysis Report (SDAR) CP-87-029 in letter number TXX-88107, dated January 18, 1988 from TU Electric to the NRC.

3.1 Corrective Action

The corrective action included the issuance of design change documentation for the replacement of a flow orifice plate, the addition of check valves upstream of each thermal barrier, and the modification of instrumentation. In addition, new calculations have been performed based on the Design Basis Document (Reference

4.2) which replace the existing calculations to validate the design, including postulated radiological releases.

3.2 Preventive Action

The design criteria have been documented in the Design Basis Documents (DBDs) (References 4.1 and 4.2) which were used as the basis for the design validation calculations.

4.0 References

4.1 CPSES Design Basis Document DBD-ME-028, Classification of Structures, Systems and Components, Revision 1.

4.2 CPSES Design Basis Document DBD-ME-229, Component Cooling Water System, Revision 1.

4.3 Section 15.6.2, CPSES FSAR.

SUBAPPENDIX A19

MISSING VALVE SIZING CALCULATIONS (CYGNA RIL NO. M-6)

1.0 Definition of the Issue

The issue was that incomplete documentation existed for the sizing of the relief valve, vent valve, and vacuum breaker on the Component Cooling Water (CCW) surge tank, and therefore, they may not have been properly sized.

2.0 Issue Resolution

This issue was resolved by performing a review of the CCW surge tank vent design. A replacement calculation was developed to adequately size the vent based on design flow conditions. The calculation was prepared and controlled utilizing the requirements of design control Project Procedure PP-009 (Reference 4.1) in order to assure adequate documentation. This review resulted in the replacement of the CCW surge tank relief valve, vent valve, and vacuum breaker with open vents.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

The issue has been determined not to be reportable under the provisions of 10CFR50.55(e).

3.1 Corrective Action

Replacement calculations have been performed based on the Design Basis Document (DBD) (Reference 4.2) to validate the design. Based on these calculations, SWEC revised the overpressure and vacuum protection design for the Component Cooling Water (CCW) surge tank. The hardware modifications have been implemented.

3.2 Preventive Action

The design criteria have been documented in the Design Basis Document (DBD) (Reference 4.2) and were used as the basis for the design validation calculations. SWEC design control Project Procedure PP-009 (Reference 4.1) requires that all calculations be checked and independently reviewed to assure accuracy and that the calculation documentation is properly controlled.

4.0 References

4.1 Project Procedure PP-009, Preparation and Control of Manual and Computerized Calculations, Revision 2, August 13, 1987.

4.2 DBD-ME-229, Component Cooling Water System, Revision 1.

SUBAPPENDIX A20

COMPONENT COOLING WATER SURGE TANK SIZING AND DESIGN BASIS (CYGNA RIL No. M-7)

1.0 Definition of the Issue

The issues were as follows:

1.1 System Inleakage

The original calculations may not have properly considered inleakage into the Component Cooling Water (CCW) system caused by failure in systems cooled by the CCW system.

1.2 Design Pressure

The original calculations may not have properly determined the Component Cooling Water (CCW) surge tank design pressure.

2.0 Issue Resolution

The issues were resolved as follows:

2.1 System Inleakage

SWEC performed a replacement calculation which considered inleakage in accordance with the design criteria specified in the Component Cooling Water (CCW) Design Basis Document (DBD) (Reference 4.1). This replacement calculation has resulted in a design change to the surge tank level setpoints. With this design change, the CCW surge tank size was validated.

2.2 Design Pressure

SWEC performed a replacement calculation which determined surge tank design pressure in accordance with the criteria specified in the Design Basis Document (DBD) (Reference 4.1). A design change to add open tank vents was implemented. With this design change the surge tank design pressure was validated.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of these issues.

These issues were determined to be reportable under the provisions of 10CFR50.55(e). This issue was reported as Significant Deficiency Analysis Report (SDAR) CP-88-001, Component Cooling Water Surge Tank Capacity, in letter number TXX-88114, dated January 18, 1988 from TU Electric to the NRC.

3.1 Corrective Action

SWEC performed replacement calculations in accordance with the design criteria specified in the Design Basis Document (DBD) (Reference 4.1). Design changes were implemented to the surge tank vent lines and level setpoints.

3.2 Preventive Action

The design criteria have been documented in the Design Basis Document (DBD) (Reference 4.1) and were used as the basis for the design validation calculation. SWEC design control Project Procedure PP-009 (Reference 4.2) requires that all calculations be checked and independently reviewed to assure accuracy and that the calculation documentation is properly controlled.

4.0 References

4.1 DBD-ME-229, Component Cooling Water, Revision 1.

4.2 Project Procedure PP-009, Preparation and Control of Manual and Computerized Calculations, Revision 2, August 13, 1987.

SUBAPPENDIX A21

COMPONENT COOLING WATER PUMP MOTOR SIZING (CYGNA RIL No. M-8)

1.0 Definition of the Issue

The issue was that the Component Cooling Water (CCW) pump motor may not have been sized correctly. Specifically, with the pump discharge valve open, the pump accelerating time may not be within the limits of the emergency Diesel Generator loading sequence.

2.0 Issue Resolution

SWEC resolved the issue by preparation of replacement flow calculations with the pump discharge valve open in accordance with the design criteria specified in the Design Basis Document (DBD) (Reference 4.1). SWEC validated that the motor vendor documentation is consistent with the calculation results. Therefore, the motor will accelerate the pump to its design condition within the limits of the emergency Diesel Generator loading sequence.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue was determined not to be reportable under the provisions of 10CFR50.55(e).

3.1 Corrective Action

SWEC reviewed the vendor speed torque curve to ascertain that the motor develops sufficient torque to accelerate the pump to its design flow and pressure conditions within the required acceleration time, as specified by the fluid system performance analysis and design criteria as documented in the Design Basis Document (DBD) (Reference 4.1).

3.2 Preventive Action

The Component Cooling Water (CCW) pump motor sizing criteria have been documented in the Design Basis Document (DBD) (Reference 4.1).

4.0 References

4.1 CPSES Design Basis Document DBD-ME-229, Component Cooling Water System, Revision 1.

SUBAPPENDIX A22

COMPONENT COOLING WATER SURGE TANK VENT/RELIEF (CYGNA RIL No. M-9)

1.0 Definition of the Issue

The issue was whether the single failure criterion was applied to the design of the Component Cooling Water (CCW) surge tank vent line and whether the vent line has the ability to provide proper overpressure protection.

2.0 Issue Resolution

SWEC performed a replacement calculation to adequately size the tank vent in accordance with the design criteria specified in the Component Cooling Water (CCW) Design Basis Document (DBD) (Reference 4.1). This replacement calculation resulted in a design change to replace the CCW surge tank relief valve, vent valve, and vacuum breaker with open vents.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue was determined not to be reportable under the provisions of 10CFR50.55(e).

3.1 Corrective Action

SWEC performed replacement calculations in accordance with the design criteria specified in the Design Basis Document (DBD) (Reference 4.1). A design change was implemented to replace the Component Cooling Water (CCW) surge tank relief valve, vent valve and vacuum breaker with open vents.

3.2 Preventive Action

The design criteria have been documented in the Design Basis Document (DBD) (Reference 4.1) and were used as the basis for the design validation calculations. SWEC design control Project Procedure PP-009 (Reference 4.2) requires that all calculations be checked and independently reviewed to assure accuracy and that the calculation documentation is properly controlled.

4.0 References

4.1 CPSES Design Basis Document DBD-ME-229, Component Cooling Water System, Revision 1.

4.2 Project Procedure PP-009, Preparation and Control of Manual and Computerized Calculations, Revision 2, August 13, 1987.

SUBAPPENDIX A23

COMPONENT COOLING WATER VALVES HV-4572 and HV-4573
PARTIAL OPEN POSITION SETPOINT CALCULATION
(CYGNA Question .088-02)

1.0 Definition of the Issue

The issue was that there was insufficient justification for the setpoint criteria for the partial open position of valves HV-4572 and HV-4573. These are the Component Cooling Water (CCW) discharge valves for the Residual Heat Removal (RHR) heat exchangers.

2.0 Issue Resolution

SWEC resolved this issue by developing replacement calculations based on the design criteria specified in the Design Basis Document (DBD) (Reference 4.1). These replacement calculations validated the setpoint for these valves in the partial open position.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue was determined not to be reportable under the provisions of 10CFR50.55(e).

3.1 Corrective Action

SWEC performed replacement calculations based on the design criteria specified in the Design Basis Document (DBD) (Reference 4.1). These calculations replace the original calculations, and validate the partial open position of the valves.

3.2 Preventive Action

The design criteria have been documented in the Design Basis Document (DBD) (Reference 4.1) and were used for the design validations.

4.0 References

4.1 CPSES Design Basis Document DBD-ME-229, Component Cooling Water System, Revision 1.

SUBAPPENDIX A24

MECHANICAL EQUIPMENT SEPARATION CRITERIA (CYGNA Question .088-04)

1.0 Definition of the Issue

The issue was that clearance (separation) requirements between cable tray supports and mechanical components and piping were not adequately identified by design documents.

2.0 Issue Resolution

A specification (Reference 4.1) was developed to provide separation criteria for commodity clearances. The Post Construction Hardware Validation Program (PCHVP) is being performed in accordance with Field Verification Method (FVM) (Reference 4.2) to document and validate commodity clearance.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue has been determined not to be reportable under the provisions of 10CFR50.55(e)

3.1 Corrective Action

SWEC established a commodity clearance specification (Reference 4.1) which includes requirements for adequate separation of mechanical components and other items. The Post Construction Hardware Validation Program (PCHVP) is being performed in accordance with Field Verification Method (FVM) (Reference 4.2) to document and validate commodity clearance.

3.2 Preventive Action

SWEC established a commodity clearance specification (Reference 4.1) which includes requirements for adequate separation of mechanical components and other items.

4.0 References

4.1 Comanche Peak Specification CPES-S-1021, Commodity Clearance, Revision 0, June 5, 1987.

4.2 Field Verification Method (FVM), Commodity Clearance, CP-SWEC-FVM-CS-068, Revision 0, July 30, 1987.

SUBAPPENDIX A25

COMPONENT COOLING WATER PUMP DISCHARGE PRESSURE SWITCH SETPOINT BASIS (CYGNA Question .088-05)

1.0 Definition of the Issue

The issue was that the setpoint criteria to determine pressure settings of the Component Cooling Water (CCW) pump discharge pressure switches PS-4518 and PS-4519 were not adequately defined and documented.

2.0 Issue Resolution

SWEC developed a replacement calculation in accordance with design criteria specified in the Design Basis Document (DBD) (Reference 4.1) to validate the pressure setpoint. These new calculations were prepared and controlled utilizing the requirements of design control Project Procedure PP-009 (Reference 4.2) in order to assure adequate documentation.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue was determined not to be reportable under the provisions of 10CFR50.55(e).

3.1 Corrective Action

SWEC performed a replacement calculation based on the design criteria specified in the Design Basis Document (DBD) (Reference 4.1). This calculation replaces the original calculation and resolves the issue addressed above.

3.2 Preventive Action

The pressure setpoint design criteria have been documented in the Design Basis Document (DBD) (Reference 4.1) and were used as the basis for the setpoint calculation. SWEC design control Project Procedure PP-009 (Reference 4.2) requires that all calculations be checked and independently reviewed to assure accuracy and that the calculation documentation is properly controlled.

4.0 References

4.1 CPSES Design Basis Document DBD-ME-229, Component Cooling Water System, Revision 1.

4.2 Project Procedure PP-009, Preparation and Control of Manual and Computerized Calculations, Revision 2, August 13, 1987.

SUBAPPENDIX A26

COMPONENT COOLING WATER VALVES HV-4572 AND HV-4574 INLET PRESSURE AND SHUTOFF DIFFERENTIAL PRESSURE (CYGNA Question .088-06)

1.0 Definition of the Issue

The issue was that the design documentation for valves HV-4572 and HV-4574 did not provide a sufficient basis for the valve inlet pressure and shutoff differential pressure.

2.0 Issue Resolution

SWEC developed replacement calculations in accordance with the design criteria specified in the Design Basis Document (DBD) (Reference 4.1) to validate the valve pressures and to provide adequate design basis documentation. These design values were compared against the vendor documentation which confirmed that the valves meet the system design basis.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue was determined not to be reportable under the provisions of 10CFR50.55(e).

3.1 Corrective Action

SWEC performed a replacement calculation based on the design criteria documented in the Design Basis Document (DBD) (Reference 4.1) which replaced the existing calculation to validate the design of valves HV-4572 and HV-4574.

3.2 Preventive Action

The system design criteria have been documented in the Design Basis Document (DBD) (Reference 4.1) and were used as the basis in the validation. SWEC design control Project Procedure PP-009 (Reference 4.2) requires that all calculations be checked and independently reviewed to assure accuracy and to assure proper documentation and retrievability.

4.0 References

4.1 CPSES Design Basis Document DBD-ME-229, Component Cooling Water System, Revision 1.

4.2 Project Procedure, PP-009, Preparation and Control of Manual and Computerized Calculations, Revision 2, August 13, 1987.

SUBAPPENDIX A27

FLOW BALANCING ORIFICE SIZING DATA TRANSFER (CYGNA Question .088-11)

1.0 Definition of the Issue

The issue was that the method of transferring sizing data to the orifice fabricator may have been inadequate.

2.0 Issue Resolution

SWEC resolved this issue by reviewing the component specification (Reference 4.1) and past correspondence between the engineers and the vendor and determined that the proper transfer of data had occurred.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue was determined not to be reportable under the provisions of 10CFR50.55(e).

3.1 Corrective Action

No corrective action is required.

3.2 Preventive Action

SWEC has developed design control Project Procedure PP-023 (Reference 4.2) which provides a controlled method of transferring component data to vendors.

4.0 References

4.1 Comanche Peak Specification 2323-MS-62, Orifice Plates, Flow Restriction Type - Nuclear, Revision 0, June 9, 1987.

4.2 Project Procedure PP-023, Processing of Design Change Authorizations (DCAs) and Change Verification Checklists (CVCs), Revision 5, January 4. 1988.

SUBAPPENDIX A28

SSER 10 REVIEW

1.0 Definition of the Issue

The issue was that the original installation specification did not adequately address the support of the main steam line during flushing and did not provide for temporary supports for piping and equipment in general to assure that the quality of the affected piping and equipment would not be affected.

2.0 Issue Resolution

Adequacy of the main steam piping and supports during the flushing process was demonstrated by stress analysis reported in the Large Bore Piping and Pipe Supports Project Status Report (PSR), Appendix A37 (Reference 4.2). The installation specification (Reference 4.1) was revised to include specific guidance for supporting piping during hydrotesting, flushing, and pipe installation.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue has been determined not to be reportable under the provisions of 10CFR50.55(e).

3.1 Corrective Action

The installation specification (Reference 4.1) was revised to include specific guidance for supporting piping during hydrotesting, flushing and pipe installation.

3.2 Preventive Action

The installation specification (Reference 4.1) was revised to include specific guidance for supporting piping during hydrotesting, flushing and pipe installation.

4.0 References

4.1 Comanche Peak Specification 2323-MS-100, Field Fabrication and Erection of Piping and Pipe Supports, Revision 9, July 9, 1987.

4.2 Large Bore Piping and Pipe Supports Project Status Report (PSR), Revision 0.

APPENDIX B

ISSUES IDENTIFIED DURING THE PERFORMANCE OF THE CORRECTIVE ACTION PROGRAM (CAP)

This appendix describes the details of the resolution of issues determined to be reportable under the provisions of 10CFR50.55(e) that were identified during the performance of the mechanical portion of the Corrective Action Program (CAP). Included in these appendices are mechanical systems and component-related Significant Deficiency Analysis Reports (SDARs) initiated by TU Electric. Specific references to the criteria, procedures, engineering evaluations, and design changes which have resolved the issue are provided.

To report the resolution of issues identified during the performance of the Corrective Action Program (CAP), an individual Subappendix was developed for each issue. Each Subappendix includes: a definition of the issue; issue resolution; and corrective and preventive action.

The preventive action is embodied in the procedures and Design Basis Document (DBD) developed and used in the mechanical portion of Corrective Action Program (CAP). These procedures and Design Basis Documents (DBDs) resolve the mechanical Corrective Action Program (CAP) issues. Implementation of these preventive actions will assure that the design and hardware for CPSES Unit 1 and Common will continue to comply with the licensing commitments throughout the life of the plant as described in Section 5.4.

Corrective Action Program (CAP) issues contained in Appendix B are listed below:

Issue No.		Issue Title
B1	SDAR CP-88-017,	Control Room Habitability
B2	SDAR CP-87-015,	Air Accumulators for Control Valves and Dampers
B3	SDAR CP-87-025,	DG Fuel Oil Tank Vent Missile Protection
B4	SDAR CP-87-050,	Turbine Driven Auxiliary Feedwater Pump Bearing Temperature
B5	SDAR CP-87-064,	Design Basis Tornado Analysis
B6	SDAR CP-87-090,	Residual Heat Removal Relief Valve Piping
B7	SDAR CP-87-103,	Cracked Gears in Valve Operators
B8	SDAR CP-88-016,	Containment Spray Chemical Additive Tank
B9	SDAR CP-87-019,	Ambient Temperature Effects on Main Steam Isolation Valve Actuators
B10	SDAR CP-87-137,	Diesel Generator Governor Oil Cooler Baffle Plate
B11	SDAR CP-87-46	Containment Spray Pump Motor Rotor/Stator Gap

SUBAPPENDIX B1

SDAR CP-88-017, CONTROL ROOM HABITABILITY

1.0 Definition of the Issue

The issue was that the control room habitability was not determined for all postulated accidents.

2.0 Issue Resolution

This issue was resolved by the following design modifications:

- Upgrading the existing control room intake monitors to safety-related Class 1E requirements.
- Upgrading the power cables and control cables associated with the existing monitors to safety-related Class 1E requirements.
- Installation of two additional safety-related Class 1E radiation monitors, one in each control room intake, with power and control cables similar to the above.

SWEC developed new radiological calculations for Control Room Habitability based on the design criteria specified in the Design Basis Document (DBD) (Reference 4.1). These calculations, in conjunction with the following design modifications, validate that the radiation doses to the operators in the control room are within the allowable limits specified in the Design Basis Document (DBD) (Reference 4.1).

The design modifications are being implemented.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue was determined to be reportable under the provisions of 10CFR50.55(e). It was reported as Significant Deficiency Analysis Report (SDAR) CP-88-017, in letter number TXX-88102, dated January 18, 1988, from TU Electric to the NRC.

3.1 Corrective Action

Design changes were developed for the replacement of power and control cables and addition of one safety-related Class 1E monitor in each control room intake.

Documentation required to verify that the existing intake monitors meet the Class 1E safety-related requirements has been identified and is being implemented. New calculations were developed which validate radiation doses to the operators in the control room are

within the allowable limits specified in the Design Basis Document (DBD) (Reference 4.1).

The design modifications are being implemented.

3.2 Preventive Action

The design criteria has been documented in the Design Basis Document (DBD) (Reference 4.1) which was used as the basis for the design validation of the Control Room Habitability calculations. SWEC design control Project Procedure PP-009 (Reference 4.2) requires that all safety-related calculations be checked and independently reviewed to assure accuracy and that the calculation documentation is properly controlled.

4.0 References

4.1 CPSES Design Basis Document DBD-ME-003, "Control Room Habitability", Revision 1.

4.2 Project Procedure PP-009, "Preparation and Control of Manual and Computerized Calculations", Revision 2, dated August 13, 1987.

SUBAPPENDIX B2

SDAR CP-87-015, AIR ACCUMULATORS FOR CONTROL VALVES AND DAMPERS

1.0 Definition of the Issue

The issue was that desiccant was left in some air accumulators which is not in accordance with the installation specification (Reference 4.1). In addition, rust, scale, and desiccant found in some of the accumulators indicates that Quality Control (QC) inspection procedures were not properly implemented.

2.0 Issue Resolution

SWEC resolved this issue by identifying that desiccant was left in 12 air accumulators and rust/scale existed in 6 air accumulators after installation was complete. Nonconformance reports were issued and dispositioned to disassemble all 12 air accumulators. Desiccant, rust and scale have been removed and the air accumulators restored to their original design condition.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue was determined to be reportable under the provisions of 10CFR50.55(e). It was reported as Significant Deficiency Analysis Report (SDAR) CP-87-015, in letter number TXX-88009, dated January 18, 1988, from TU Electric to the NRC.

3.1 Corrective Action

All air accumulators have been disassembled, all desiccant rust and scale removed and the air accumulators restored to their original design condition. The accumulators' as-built conditions are being verified and documented by Quality Control (QC) inspections (References 4.2, 4.3 and 4.6) to ensure the installations are in accordance with installation criteria (References 4.1 and 4.2). This activity will be completed by August 1, 1988.

3.2 Preventive Action

The installation specification (Reference 4.1), QC inspection procedures (References 4.5 and 4.6), and the construction procedure (References 4.2 and 4.4) contain the correct requirements for the equipment installation. As required by References 4.7 and 4.8, construction and Quality Control (QC) personnel have been trained in the proper use and execution of this procedure. Continued service with dry instrument air will preclude rust and scale from forming in the accumulators.

4.0 References

4.1 Comanche Peak Specification 2323-MS-101, Mechanical Erection Specification, Revision 5, May 14, 1987.

4.2 Construction Procedure 35-1195-MCP-1, General Installation of Mechanical Equipment, Revision 4, August 1, 1984.

4.3 Construction Procedure ACP 14.1, Cleanliness Control, Revision 1, November 16, 1987.

4.4. Construction Procedure ACP 14.2, Storage and Maintenance of Mechanical Equipment, Revision 0, July 10, 1987.

4.5 Quality Assurance Procedure AQP 14.1, Storage and Maintenance of Equipment Inspection, Revision 1, November 16, 1987.

4.6 Quality Assurance Procedure AQP 11.1, General Fabrication and Installation Inspection, Revision 1, November 16, 1987.

4.7 Construction Procedure CP-CPM-2.2, Training of Personnel in Procedural Requirements, Revision 7, August 14, 1987.

4.8 Quality Assurance Procedure AAP-2.2, QA Personnel Training and Qualification, Revision 0, July 10, 1987.

SUBAPPENDIX B3

SDAR CP-87-025, DIESEL GENERATOR FUEL OIL TANK VENT MISSILE PROTECTION

1.0 Definition of the Issue

The issue was that the vent piping for the diesel generator fuel oil day tanks and the fuel oil storage tanks were not designed or installed such that they were protected against external missiles.

2.0 Issue Resolution

SWEC resolved this issue by developing a design change to modify the vent piping to provide external missile protection consistent with the design criteria specified in the Design Basis Document (DBD) (Reference 4.1).

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue was determined to be reportable under the provisions of 10CFR50.55(e). It was reported as Significant Deficiency Analysis Report (SDAR) CP-87-025, in letter number TXX-88105, dated January 18, 1988 from TU Electric to the NRC.

3.1 Corrective Action

A vacuum relief valve on both fuel oil day tank vent piping systems was implemented in accordance with the design requirements described in the Design Basis Document (DBD) (Reference 4.1). The relief valve and the vent piping associated with the relief valve were located within the missile-protected area and provide sufficient venting capability for each day tank and its associated storage tanks.

3.2 Preventive Action

The design criteria have been documented in the Design Basis Document (DBD) (Reference 4.1) and were used as the basis for the design modifications implemented.

4.0 References

4.1 Design Basis Document DBD-ME-215, Diesel Generator Fuel Oil Storage and Transfer System, Revision 1.

SUBAPPENDIX B4

SDAR CP-87-050, TURBINE DRIVEN AUXILIARY FEEDWATER PUMP BEARING TEMPERATURE

1.0 Definition of the Issue

The issue was that high bearing temperature in excess of the temperature limit in the vendor documentation was recorded for the Turbine Driven Auxiliary Feedwater Pump during preoperational testing.

2.0 Issue Resolution

SWEC resolved this issue by reviewing the high bearing temperature condition with the vendor. It was determined that the cause of the high bearing temperature was due to bearing misalignment. The vendor provided documentation (Reference 4.1) for the proper installation of and centering of the pump rotating elements. The revised vendor installation requirements have been incorporated into a CPSES mechanical maintenance procedure (Reference 4.2). Proper assembly of the pump prevents high bearing temperature.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue was determined to be reportable under the provisions of 10CFR50.55(e). It was reported as Significant Deficiency Analysis Report (SDAR) CP-87-050, in letter number TXX-6954, dated November 13, 1987 from TU Electric to the NRC.

3.1 Corrective Action

The auxiliary feedwater pump bearing is being realigned in accordance with the revised vendor installation documentation which has been included in the CPSES mechanical maintenance procedure (Reference 4.2). In addition, new bearing centering springs are being installed to ensure bearing alignment. The pump is included in the CPSES retest program with bearing temperature as a measured parameter.

3.2 Preventive Action

The revised vendor installation documentation has been included in the CPSES mechanical maintenance procedure (Reference 4.2) to prevent reoccurrence of bearing misalignment.

4.0 References

4.1 Ingersoll-Rand Technical Bulletin No. 60-87, August 7, 1987

4.2 Mechanical Maintenance Procedure MMP-312, Turbine Driven Auxiliary Feedwater Pump Inspection, Revision 0, December 4, 1987.

SUBAPPENDIX B5

SDAR CP-87-064, DESIGN BASIS TORNADO ANALYSIS

1.0 Definition of the Issue

The issue was that insufficient engineering documentation existed upon which to base an evaluation of tornado effects (negative pressure transient) on safety-related systems and components whose safety function could be susceptible to rapid changes in atmospheric pressure.

2.0 Issue Resolution

An engineering evaluation of safety-related equipment was conducted in order to document the Design Basis Tornado effects on those susceptible safety-related systems and components required to function during or after a tornado. Where the tornado effects on specific equipment is a function of location/configuration, engineering evaluations (Reference 4.6) are being conducted as part of the Post Construction Hardware Validation Program (PCHVP).

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue was determined to be reportable under the provisions of 10CFR50.55(e). It was reported as Significant Deficiency Analysis Report (SDAR) CP-87-064, in letter number TXX-88086, dated January 20, 1988, from TU Electric to the NRC.

3.1 Corrective Action

Differential pressure data from the tornado venting analysis was validated by supplemental calculations and was used for evaluation of safety-related systems and equipment. These calculations were performed in a controlled manner using Project Procedure PP-009 (Reference 4.1) and they provide the proper documentation of CPSES Unit 1 and Common compliance with design criteria as specified in the Design Basis Document (DBD) (Reference 4.5).

Safety-related power plant equipment types whose safety function may be susceptible to the tornado negative pressure transient have been identified. An engineering evaluation of the specific safety-related equipment and systems is being conducted using as-built equipment locations and configurations to completely assess the tornado negative pressure effects. The Post Construction Hardware Validation Program (PCHVP) provides these as-installed conditions for equipment evaluation, where the actual installation configuration is required to evaluate the tornado negative pressure effects.

3.2 Preventive Action

The design criteria have been documented in the Design Basis Document (DBD) (Reference 4.5). SWEC Project Procedure PP-009 (Reference 4.1) requires that all calculations be checked and independently reviewed to assure accuracy and that the calculation documentation is properly controlled. SWEC design control Project Procedures PP-023, PP-031, and PP-066 (References 4.2 through 4.4) assure that the appropriate system evaluation and interdiscipline review is accomplished for design.

4.0 References

4.1 Project Procedure PP-009, Preparation and Control of Manual and Computerized Calculations, Revision 2, August 13, 1987.

4.2 Project Procedure PP-023, Processing of Design Change Authorizations (DCAs) and Change Verification Checklists (CVCs), Revision 5, January 4, 1988.

4.3 Project Procedure PP-031, Preparation and Issuance of Design Modifications (DMs), Revision 0, May 19, 1987.

4.4 Project Procedure PP-066, Initiation of Design Modification Requests (DMRs), Revision 1, August 19, 1987.

4.5 CPSES Design Basis Document DBD-ME-009, Tornado Venting Analysis, Revision 0.

4.6 TU Electric ECE-9.04-05, Engineering and Construction Engineering Procedure, Post Construction Hardware Validation Program Engineering Evaluations, Revision 0, September 1, 1987.

SUBAPPENDIX B6

SDAR CP-87-090, RESIDUAL HEAT REMOVAL RELIEF VALVE PIPING

1.0 Definition of the Issue

The issue was that the Residual Heat Removal relief valve piping arrangement prevented the proper operation of the relief valves. This condition could cause the Residual Heat Removal system design pressure to be exceeded due to flow transients during relief valve operation.

2.0 Issue Resolution

SWEC developed design changes modifying the relief valves piping arrangement. These design changes minimize the effects of the flow transients and allow proper relief valve operation. Therefore, the relief valves will operate as designed to prevent Residual Heat Removal system overpressurizations. Hardware modifications are being implemented.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue was determined to be reportable under the provisions of 10CFR50.55(e). It was reported as Significant Deficiency Analysis Report (SDAR) CP-87-090, in letter number TXX-88109, dated January 19, 1988 from TU Electric to the NRC.

3.1 Corrective Action

SWEC developed a design change which relocates the subject relief valves as close as possible to the Residual Heat Removal piping it protects. Hardware modifications are being implemented.

3.2 Preventive Action

The design change identified in Corrective Action restored the Residual Heat Removal system design to conformance with the criteria in the Design Basis Document (DBD) (Reference 4.1). The design criteria have been documented in the Design Basis Document (DBD) (Reference 4.1). SWEC Project Procedure PP-009 (Reference 4.2) requires that all calculations be checked and independently reviewed to assure accuracy and that the calculation documentation is properly controlled. SWEC design control Project Procedures PP-023, PP-031, and PP-066 (References 4.3 through 4.5) assure that the appropriate system evaluation and interdiscipline review is accomplished for design changes.

4.0 References

4.1 CPSES Design Basis Document DBD-ME-260, Residual Heat Removal System, Revision 0.

4.2 Project Procedure PP-009, Preparation and Control of Manual and Computerized Calculations, Revision 2, August 13, 1987.

4.3 Project Procedure PP-023, Processing of Design Change Authorizations (DCAs) and Change Verification Checklists (CVCs), Revision 5, January 4, 1988.

4.4 Project Procedure PP-031, Preparation and Issuance of Design Modifications (DMs), Revision 0, May 19, 1987.

4.5 Project Procedure PP-066, Initiation of Design Modification Requests (DMRs), Revision 1, August 19, 1987.

SUBAPPENDIX B7

SDAR CP-87-103, CRACKED GEARS IN VALVE OPERATORS

1.0 Definition of the Issue

The issue was that Limitorque HBC-3 valve drives use cast bronze sector gears which were observed to have visible defects and cracks in the web area where the sector gear housing bolts to the drive sleeves.

2.0 Issue Resolution

SWEC resolved this issue by reviewing the design of similar valve operator applications. To date, 10 valve operators have been identified as having the cast bronze sector gear HBC-3 drive assembly; 2 valve operator sector gear assemblies have visible defects and cracks. All valve vendors supplying Limitorque valve operators for CPSES have been informed of the deficient parts, and are providing complete identification of CPSES-supplied Limitorque HBC-3 valve drives. They are also providing recommended replacement sector gear designs. All plant Limitorque HBC-3 valve drives are being disassembled, and deficient sector gear assemblies will be replaced with vendor recommended parts.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue was determined to be reportable under the provisions of 10CFR50.55(e). It was reported as Significant Deficiency Analysis Report (SDAR) CP-87-103, in letter number TXX-88020, dated January 21, 1988 from TU Electric to the NRC.

3.1 Corrective Action

All CPSES Limitorque HBC-3 valve sector gears will be disassembled and inspected (Reference 4.1) for deficient parts. Those parts found to be deficient will be replaced with gear assemblies based upon the respective vendor's review and recommended replacement designs.

3.2 Preventive Action

Vendors have been notified of this deficient design and are developing design modifications to preclude reoccurrence. Restrictions will be documented for future procurement activities involving HBC operators.

4.0 References

4.1 Field Verification Method (FVM), PCHVP Construction/Quality Control Reverifications, CPE-SWEC-FVM-EE/ME/IC/CS-086, Revision 2, October 15, 1987.

SUBAPPENDIX B8

SDAR CP-88-016, CONTAINMENT SPRAY CHEMICAL ADDITIVE TANK

1.0 Definition of the Issue

The issue was that the Containment Spray Chemical Additive Tank construction material was such that the expected corrosion rate from its contained caustic process fluid would result in less than the minimum allowable tank and outlet pipe wall thicknesses earlier than the specified design life of these items.

2.0 Issue Resolution

This issue was resolved by determining that the Containment Spray Chemical Additive Tank, outlet piping and valve wall thicknesses are presently adequate for initial plant operations. A corrosion monitoring program for the tank and the outlet piping and valves, which will be exposed to the contained sodium hydroxide process fluid, will be used during plant life to determine when the affected tank, piping and valves must be replaced with more corrosion resistant materials before minimum allowable tank or pipe/valve wall thicknesses are reached.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue was determined to be reportable under the provisions of 10CFR50.55(e). It was reported as Significant Deficiency Analysis Report (SDAR) CP-88-016, in letter number TXX-88116 dated January 19, 1988 from TU Electric to the NRC.

3.1 Corrective Action

Using the design criteria established in the Design Basis Document (DBD) (Reference 4.1), SWEC performed minimum wall thickness calculations to determine the expected design life of the Chemical Additive Tank, and outlet piping and valves. These calculations were performed in accordance with Project Procedure PP-009 (Reference 4.2) which requires that all calculations be checked and independently reviewed to assure accuracy and that the calculation documentation is properly controlled. Based upon these calculations, predicted corrosion over the plant design life could violate tank minimum wall thicknesses. A corrosion monitoring program for the tank and outlet piping/valves will be used during plant/equipment life. The results of this corrosion monitoring program will evaluate the remaining life of the chemical additive system during inprocess operation and allow appropriate scheduling of tank and/or piping/valves replacement, as required.

3.2 Preventive Action

The design specifications (References 4.3, 4.4 and 4.5) for the Containment Spray Chemical Additive Tank and associated components have been revised to specify ASTM TP-316 stainless steel materials for future procurement of components for this system. The corrosion monitoring program will determine when component replacement with the more corrosion resistant material is required.

4.0 References

4.1 CPSES Design Basis Document DBD-ME-232, Containment Spray System, Revision 1.

4.2 Project Procedure PP-009, Preparation and Control of Manual and Computerized Calculations, Revision 2, August 13, 1987.

4.3 Comanche Peak Specification 2323-MS-20A.1, Manual Self-Actuated Steel Valves - 2 In. and Smaller, Revision 2, December 1, 1976.

4.4 Comanche Peak Specification 2323-MS-20B, Manual, Motor-Operated and Self-Actuated Steel Valves - 2.5 In. and Greater (Saunders Diaphragm Type), Revision 1, December 13, 1975.

4.5 Comanche Peak Specification 2323-MS-065, Shop Fabricated Tanks - Nuclear, Revision 3, November 19, 1976.

SUBAPPENDIX B9

SDAR CP-87-019, AMBIENT TEMPERATURE EFFECTS ON MAIN STEAM ISOLATION VALVE ACTUATORS

1.0 Definition of the Issue

The issue was that information from other nuclear plants and vendor testing results indicated that the thermal compensating accumulators on the Main Steam Isolation Valve (MSIV) actuators may not function properly over the specified ambient temperature range of 80 degrees F.

2.0 Issue Resolution

SWEC resolved the issue by working with the vendor to develop a design modification to comply with the specified ambient temperature range. The actuators are being returned to the vendor for hardware modifications that will permit actuator operation over an ambient temperature range of 80 degrees F.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue was determined to be reportable under the provisions of 10CFR50.55(e). It was reported as Significant Deficiency Analysis Report (SDAR) CP-87-019, in letter number TXX-88104, dated January 18, 1988 from TU Electric to the NRC.

3.1 Corrective Action

A design modification has been developed by the vendor to modify the MSIV actuators by installing a pressure relief valve in the hydraulic system of the actuator's thermal compensating accumulators. This modification is being implemented and will permit MSIV actuator operation over the full ambient temperature range of 80 degrees F as specified in the Design Basis Document (DBD) (Reference 4.1).

3.2 Preventive Action

The vendor has developed a revised design which eliminates recurrence of the issue.

4.0 References

4.1 CPSES Design Basis Document DBD-ME-202, Main Steam System, Revision 1.

4.2 Equipment Qualification Project Status Report (PSR), Revision 0.

SUBAPPENDIX B10

SDAR CP-87-137, DIESEL GENERATOR GOVERNOR OIL COOLER BAFFLE PLATE

1.0 Definition of Issue

The issue was that a baffle plate in one of the emergency diesel generator governor oil coolers was found to be loose. Complete failure of this baffle plate could adversely affect the operating temperature of the governor oil and, thereby, the speed control of the diesel generator.

2.0 Issue Resolution

SWEC has resolved thi. issue by contacting the vendor who had developed a design modification which replaces the deficient oil cooler internals. SWEC has reviewed the design of the remaining diesel generator governor oil coolers and other similar safety-related governor oil coolers and found that the governor oil cooler of the turbine-driven auxiliary feedwater pump is of the same manufacturer and design. Replacement internals for these coolers are also being implemented.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue was determined to be reportable under the provisions of 10CFR50.55(e). It was reported as Significant Deficiency Analysis Report (SDAR) CP-87-137, in letter number TXX-88127 dated January 20, 1988 from TU Electric to the NRC.

3.1 Corrective Action

The deficient governor oil coolers have been replaced with the revised internals design developed by the vendor. SWEC review of similar safety-related governor oil coolers has been completed and another potential deficiency found in the turbine-driven auxiliary feedwater pump governor oil cooler. Replacement internals for these coolers are also being implemented.

3.2 Preventive Action

The vendor has been notified of the deficient component and has developed a revised design. Replacement of the internals of the affected governor oil coolers with the revised design eliminates the cause of the issue.

4.0 References

None

SUBAPPENDIX B11

SDAR CP-87-46, CONTAINMENT SPRAY

PUMP MOTOR ROTOR/STATOR GAP

1.0 Definition of the Issue

The issue was that the air gap (axial distance between the rotor and stator of the motor) of two containment spray pump motors exceeded specified maintenance manual tolerance limits as identified during maintenance of the equipment.

2.0 Issue Resolution

Inspection of the motors revealed an uneven air gap attributed to the presence of minimal amounts of rust, dust and metal burrs. This material was removed and the motors cleaned in accordance with electrical maintenance manual (Reference 4.1). Measurements of the air gap were retaken and found to be acceptable.

3.0 Corrective and Preventive Action

No additional issues were identified during the review and resolution of this issue.

This issue was determined to be reportable under the provisions of 10CFR50.55(e). It was reported as Significant Deficiency Analysis Report (SDAR) CP-87-46, in letter number TXX-88126, dated January 21, 1988 from TU Electric to the NRC.

3.1 Corrective Action

The motors were cleaned in accordance with electrical maintenance manual (Reference 4.1) to remove the minimal amounts of rust, dust and metal burrs that were present. Measurements of the air gap were retaken and found to be acceptable.

3.2 Preventive Action

Existing maintenance and cleanliness procedures were found to be adequate and no additional preventive action is required.

4.0 References

4.1 CPSES Electrical Maintenance Manual, Containment Spray Pump Motor Inspection, Instruction Number EMI-315, Revision 2, dated February 18, 1987.