COMANCHE PEAK RESPONSE TEAM

RESULTS REPORT

DSAP VIII

TITLE: CIVIL/STRUCTURAL - TRAIN A & B CONDUIT AND SUPPORTS

REVISION 1

Discipline Coordinator — Date: 11/4/87

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COMANCHE PEAK RESPONSE TEAM

DESIGN ADEQUACY PROGRAM

# DISCIPLINE SPECIFIC RESULTS REPORT: CIVIL/STRUCTURAL - TRAIN A & B CONDUIT AND SUPPORTS

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Revision 1
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TENERA, L.P.

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# 1.0 EXECUTIVE SUMMARY AND CONCLUSIONS

This Results Report summarizes the results of a Third Party review of the design adequacy of safety-related (Train A & B) and seismically designed non-safety-related (Train C) conduit and conduit supports (conduit/supports) at the *Comanche Peak Steam Electric Station* (CPSES). This review was performed as a part of the *Design Adequacy Program* (DAP) under the charter of the *Comanche Peak Response Team* (CPRT) Program Plan [*Ref. 7.1.2*] by a Third Party Organization (TENERA, L.P.). The approach, methodology, and scope developed to accomplish this review are described as part of the Civil/Structural *Discipline Specific Action Plan* (DSAP VIII), which is contained in Appendix C of the CPRT Program Plan, with additional modifications as defined in Revision 4 to the CPRT Program Plan, Appendix A.

DSAP VIII encompasses all of the Civil/Structural design review activities performed under the DAP, including both Project and Third Party activities related to major corrective action programs and Third Party self-initiated review activities. This Results Report is limited to summarizing the Third Party review activities associated with the overview of the CPSES conduit/supports corrective action program. This program encompasses all safety-related (Train A & B) conduit and seismically designed non-safety-related (Train C) conduit larger than 2 inches in diameter for which design validation is required.[1] As such, all subsequent references to "conduit/supports" in the text of this report shall mean the aforementioned Train A & B conduit and conduit supports and Train C conduit supports.

The CPSES conduit/supports program described in DSAP VIII consists of a 100% design validation effort performed by a *TU Electric contractor* (Project) with an overview of these activities performed by the Third Party. The contractor responsible for the design validation is *Ebasco Services Incorporated* (Ebasco). The Third Party as noted above is TENERA, L.P.

The purpose of the DSAP VIII conduit/supports program is to provide reasonable assurance that the conduit/supports at the CPSES are adequately designed and that the design validation effort resolves external source issues related to the original design. "Design Adequacy" is defined as conformance to the CPSES *Final Safety Analysis Report* (FSAR) [*Ref. 7.1.1*] and licensing commitments, including appropriate codes and standards. The purpose of the Third Party overview is to provide an element of this assurance through overview of selected portions of the program as described below. This Results Report documents the results and conclusions of the Third Party overview defined in DSAP VIII (as modified in Revision 4 to the CPRT Program Plan) with respect to both the adequacy of the conduit/supports design and the resolution of external source issues.

The scope of the Third Party review activities that were performed are as follows:

- Issue Review (DSAP VIII, Section 4.1.2.1)
- Criteria/Commitment Verification (DSAP VIII, Section 4.1.2.2)
- Conduit/supports design validation procedures and supporting documentation review (DSAP VIII, Section 4.1.2.3)

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1 Certain Unit 1 and common and all Unit 2 Train C conduit larger than 2 inches in diameter have been designed for seismic loading to the same criteria as Train A & B conduit and are addressed in this report. The balance of the Train C conduit larger than 2 inches in diameter is addressed under Issue Specific Action Plan (ISAP) II.d. All Train C conduit less than or equal to 2 inches in diameter is addressed under ISAP I.c.

Briefly stated, the review identified external source issues, established applicable criteria based on the CPSES FSAR and licensing commitments, compared Ebasco's procedures and supporting documentation with those criteria, and evaluated the resolution methodologies for the issues. Overview of the implementation of the procedures for conduit/supports, including verification of design input such as construction as-built data, will be covered under the TU Electric QA Technical Audit Program.

The identification of external source issues was accomplished by conducting a review of over 40,000 pages of NRC-docketed material. This effort resulted in the issuance of approximately 60 conduit/supports-related *Discrepancy/Issue Resolution Reports* (DIRs) to document and track concerns raised by external sources. The primary source of conduit/supports concerns was the results of the *Independent Assessment Program* (IAP) performed by *Cygna Energy Services* (Cygna). Most of the concerns expressed by other external sources were similar to, or a reiteration of, the concerns expressed by Cygna. These DIRs were consolidated into 29 issue groups to facilitate resolution of the concerns. Discussions of these issue groups are presented in Section 3.0 of this report.

The assessment of the overall adequacy of Ebasco's design validation effort was accomplished by Third Party review of the procedures, supporting special studies and tests, generic calculations, and resolution methodology for each external source issue. These reviews were performed to evaluate the adequacy of Ebasco's design validation procedures and to assess their compliance with applicable FSAR and licensing criteria. Based on the findings of these reviews, it is concluded that the design validation procedures and issue resolution methodologies are in conformance with the appropriate criteria.

In summary, the Third Party has concluded that the Project's conduit/supports design validation program is comprehensive and capable of resolving known technical issues and assuring that the design will meet the FSAR and licensing commitments.

# 2.0 SCOPE

This report addresses the Third Party design adequacy overview activities performed for safety-related (Train A & B) and seismically designed non-safety-related (Train C) conduit/supports under the guidelines of DSAP VIII. The overview activities completed are:

- External Source Issues Identification - The Third Party identified, documented, and tracked issues that were raised by external sources regarding the original Gibbs & Hill conduit/support design. This effort was performed to provide reasonable assurance that external source concerns regarding the original design have been fully identified.
- Design Criteria/Commitments Identification - The Third Party identified the design criteria and commitments that govern the design of conduit/supports for the CPSES. The primary commitment sources included the FSAR [Ref. 7.1.1], the AISC Specification [Ref. 7.5.1], and the AISI Specification [Ref. 7.5.2]. These criteria were used for the development of checklists and engineering evaluation acceptance criteria for the review of specific program areas.
- As-Built Procedures Review - The Third Party reviewed the procedures of the as-built program. This review was performed to provide reasonable assurance that important design attributes were properly identified for use in design validation activities.
- Design Validation Procedures Review - The Third Party reviewed the design and analysis procedures developed by Ebasco for the performance of conduit/support design validation. These reviews were performed to provide reasonable assurance that the design validation procedures were in compliance with the the CPSES design criteria and commitments.
- Special Studies and Generic Calculations Review - The Third Party reviewed special studies and generic calculations that were performed by Ebasco to provide a basis for the technical methods and assumptions included in their procedures or to resolve external source issues. These reviews were performed for the same purpose as the procedure reviews.
- Test Programs Review - The Third Party reviewed test specifications, procedures, and results for conduit/support tests that were performed by the Project to provide a basis for design validation procedures or to resolve external source issues. These reviews were performed to provide reasonable assurance that the tests were properly specified and performed and that the results were interpreted correctly.
- Issue Resolution Review - The Third Party reviewed the methodologies used by Ebasco in the resolution of the identified external source issues. The review included the special studies, test results, and portions of procedures that were related to the specific issues. This review was performed to provide reasonable assurance that the resolution methodologies used by Ebasco adequately address all identified issues.

The scope included the review of the items presented above for both Units 1 and 2 with the exception that certain external source issues are applicable to Unit 1 and common areas only due to differences in hardware or design procedures. The method, extent, results, and conclusions of the Third Party reviews of the above scope items are described in the remaining sections of this report.

This scope is consistent with the scope of Third Party design review activities for conduit/supports defined in Section 4.1.2 of DSAP VIII as modified by Revision 4 of the CPRT Program Plan.

# 3.0 EXTERNAL SOURCE ISSUES

This section of the report describes the Third Party activities performed in the overview of the Project's resolution of external source issues. These activities, which relate to Sections 4.1.2.1, 4.1.2.2, and 4.1.2.3 of DSAP VIII for conduit/supports, include the following:

- External Source Issues Identification,
- Design Criteria/Commitments Identification,
- As-Built Procedures Review,
- Design Validation Procedures Review,
- Special Studies and Generic Calculations Review,
- Test Programs Review, and
- Issue Resolution Review.

These activities were performed to assess the overall adequacy of Project's design validation methodology and approach for resolution of specific external source issues.

The conduct of the Third Party overview activities was in accordance with DAP Procedures [*Ref. 7.4.1*]. These procedures control the development of criteria lists and checklists, implementation of checklists, preparation of engineering evaluation reports, and the identification, documentation, and resolution of issues. A flow chart summarizing the overview activities performed by the Third Party is provided in Figure 3-1.

Section 3.1 describes the review methods, and Section 3.2 provides the results for each of the overview activities. Section 3.2.7 contains a discussion of individual issues, Projects's resolution methodology, and the results of the Third Party's evaluation for each of the external source issues.

## 3.1 Review Methodology

The Third Party review methodology for the activities delineated above is described separately for each activity in the following subsections.

### 3.1.1 External Source Issues Identification

External source issues were identified and documented in the following three steps:

- identification of external source documents,
- source document review and preparation of issue records/DIRs, and
- consolidation of individual issues into issue groups.

The initial identification of source documents focused on documents which included summaries of relevant issues, particularly information either presented to, or originated by, the *Atomic and Safety Licensing Board* (ASLB). ASLB hearing transcripts were used as a basic source of information. In addition to the ASLB hearing transcripts, filings with the board by the NRC staff, *Texas Utilities Electric Company* (TU Electric, previously Texas Utilities Generating Company or TUGCO), *Citizens Association for Sound Energy* (CASE), and *Cygna Energy Services* (Cygna) were included. The documents also encompassed transcripts of meetings between any of

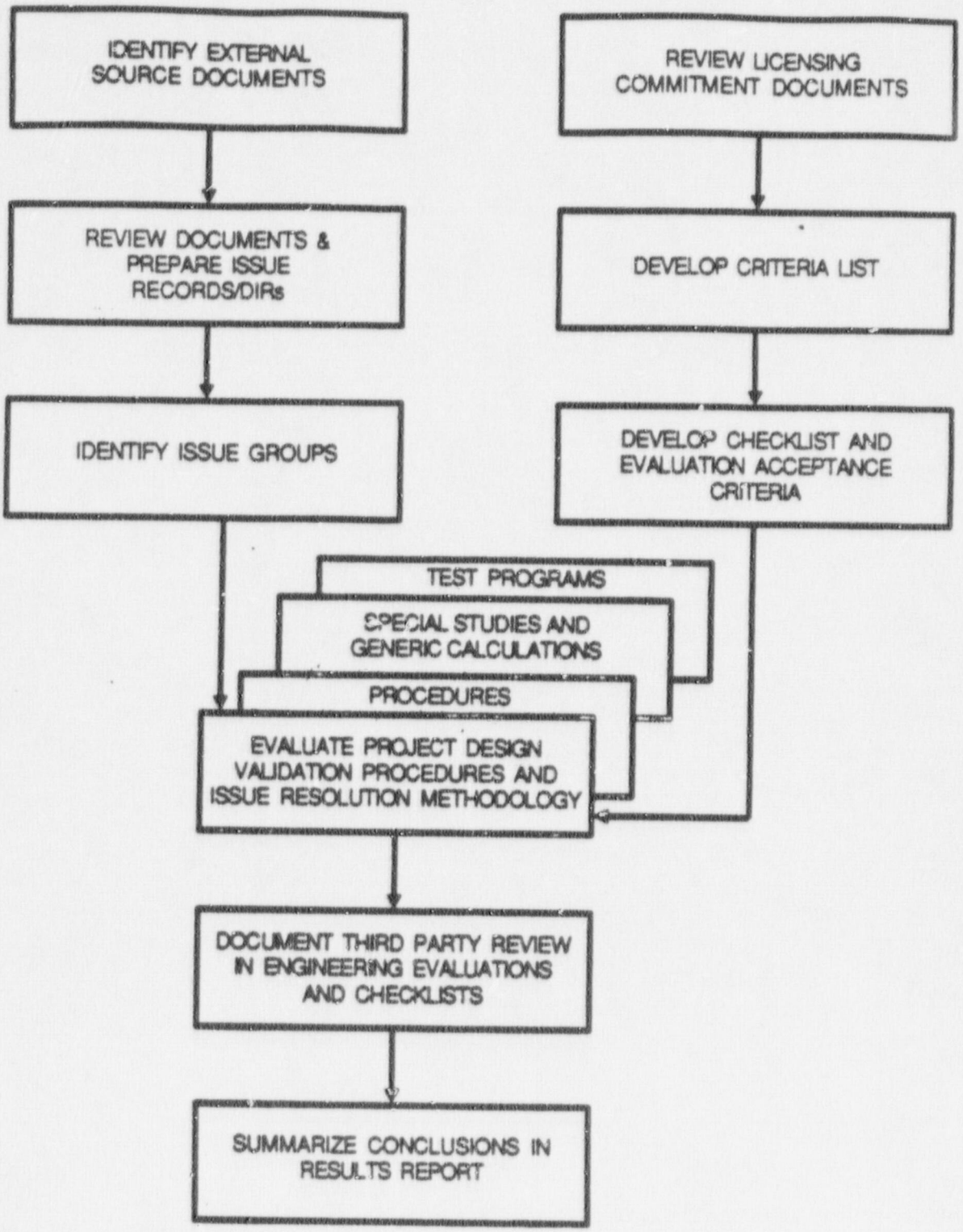


FIGURE 3-1

THIRD PARTY OVERVIEW ACTIVITIES

the above-mentioned parties, the *NRC Safety Evaluation Report* (NUREG-0797) and Supplements thereto (SSERs), and the Cygna reports and letters resulting from the *Independent Assessment Program* (IAP). A listing of all source documents used by the Third Party for external issue identification is provided as Attachment A.

Each source document listed in Attachment A was reviewed, and external source issues were documented on Issue Records to capture a minimum of one citation of each distinct issue. For every Issue Record, a DIR was issued to assist the Third Party in tracking closure of the issue. The document reference and specific page(s) on which the issue is discussed were recorded on each DIR. Following the identification and documentation of each individual issue, DIRs related to conduit/supports were grouped into common issue categories. There were 29 such categories.

External source issues were not evaluated for safety significance since the Project is performing a 100% design validation of conduit/supports and has incorporated issue resolution directly into the design validation procedures. In essence, all issues have been treated as potentially safety significant and addressed accordingly.

### 3.1.2 Design Criteria/Commitments Identification

#### Introduction

The Third Party identified design criteria and commitments applicable to CPSES conduit/supports to establish acceptance criteria for the review of Project procedures and supporting documents.

The Third Party reviews were conducted using either engineering evaluations or checklists to evaluate compliance with these established criteria and commitments.

#### Review Methodology

The design criteria and commitments applicable to CPSES conduit/supports were identified from a review of the FSAR, applicable Regulatory Guides, and referenced industry codes and standards. This was done as part of the Third Party identification of all Civil/Structural design criteria and commitments applicable to DSAP VIII activities. This effort resulted in the development of the design criteria list DAP-CR-C/S-001 [*Ref. 7.4.2*]. The criteria and commitments applicable to CPSES conduit/supports are a subset of this criteria list.

The design criteria for conduit/supports were then collectively evaluated for completeness, accuracy, and consistency. This was accomplished using the Design Criteria Review Checklist DAP-CLA-C/S-012 [*Ref. 7.4.3*].

In order to facilitate detailed assessment of conduit/supports design validation procedures, special studies, and generic calculations, two Design Review Evaluation Checklists (DAP Form Numbers C/S-S132 and C/S-S133) were developed. This was done by tailoring the general criteria for conduit/supports review. Applicable criteria were broadened into checklist attributes, as appropriate, by stating the specific requirements of the codes, standards, or regulatory guides. Additional attributes related to external source issues and adequacy of methodology were also incorporated into the checklist form.

Application of the Design Review Evaluation Checklist to a specific design procedure document involved assessment of the document's compliance with the checklist attributes. For each

attribute, the reviewer determined if the design was in compliance with design commitments. If compliance was satisfactory, the reviewer indicated "SAT." If the design was not in compliance, or was indeterminate, the disposition was "UNSAT." Each UNSAT or group of UNSATs was followed by issuance of a Discrepancy/Issue Resolution (DIR) Report that documented the finding for future evaluation and closure tracking. An attribute that was not applicable to the specific document or design was marked "N/A." If an attribute was outside the defined scope of review, it was marked "N/C" (Not Checked), indicating that it was not evaluated.

Most documents were reviewed using checklists. Due to their format, several documents were reviewed using engineering evaluations. Where engineering evaluations were used to review specific documents, the evaluation assessed the document's compliance with specific acceptance criteria that were applicable for that evaluation. If an item was found to be unsatisfactory, a Discrepancy/Issue Resolution (DIR) Report was issued to document the finding for future evaluation and closure tracking.

Engineering evaluations were also used to summarize the Third Party review of the five main activities of the Ebasco design validation program:

- Engineering walkdown
- Support capacity validation
- Junction box capacity validation
- Span allowable studies
- Isometric drawing validation

### 3.1.3 As-Built Procedures Review

#### Introduction

Design validation of conduit/supports is based on as-built information for 100 percent of the conduit systems installed in CPSES Units 1 and 2. The program for obtaining as-built information was undertaken by the Project (Ebasco) in response to external source issues that questioned the correlation of the original design drawings for Unit 1 and common to the actual constructed conditions. The purpose of this program is to assure that the information used in design validation (e.g., conduit geometry and support structural details), accurately represents CPSES conduit systems.

In Unit 1, the isometric walkdown package consists of isometric drawings and red-lined drawings for every support. All attributes considered important to design validation of the support are to be recorded. In all cases, the support location is to be recorded on an isometric drawing of the conduit run. For conduit runs covered by thermal insulation, the thermal insulation on supports is to be removed where necessary to provide access to attributes necessary to the design validation.

In Unit 2, an isometric drawing, including a drawing of all non-generic supports, is to be generated for each installed conduit run.

In Unit 2, the conduit/supports are to be inspected by TU Electric QC against the isometric drawings to confirm the accuracy of the documented information and also to check for construction quality attributes. In Unit 1, the as-built information (sketches, drawings, etc.) is to be checked at a surveillance level by the TU Electric QA Technical Audit Program.

### Review Methodology

The Third Party review of the program for obtaining as-built information included the review of TU Electric engineering walkdown procedures, and those special studies related to inaccessible attributes, (i.e., attributes that are physically inaccessible and cannot be visually examined). The scope of this review was limited to examining the adequacy of the engineering walkdown procedures for those attributes of conduit/supports that are specifically related to design.

The Third Party review was performed using engineering evaluations. The acceptance criteria for procedure reviews reflected the Third Party's identification of the physical attributes important to design.

The specific Project procedures reviewed and the corresponding DAP documentation are listed in Attachment C.

## 3.1.4 Design Validation Procedures Review

### Introduction

Ebasco has developed procedures to govern the conduit/supports design validation program. These procedures define and control the design validation process, the interfaces, and the technical methods to be employed.

### Review Methodology

The Third Party review of specific procedures was implemented using checklists or engineering evaluations. The decision regarding whether to use a checklist or an engineering evaluation was based on the format and content of the document being reviewed. As discussed previously in Section 3.1.2, the checklist that was used for design validation procedures review included additional attributes that specifically address external source issues and requirements or restrictions imposed by special studies (i.e., studies that served as the derivation of procedural methods).

The specific Ebasco procedures reviewed and the corresponding DAP documentation are listed in Attachment C.

## 3.1.5 Special Studies and Generic Calculations Review

### Introduction

Ebasco performed special studies to support the methodology contained in the procedures for design validation of conduit/supports and generic calculations to qualify standard conduit/supports. The special studies provide a basis for a number of the technical methods and assumptions that are included in the procedures or are used to resolve specific external source issues. The generic calculations provide the basis for the support capacities and allowable span lengths given on the generic S-0910 and S2-0910 drawings.

### Review Methodology

The Third Party review of special studies and generic calculations was implemented using checklists and engineering evaluations. The acceptance criteria were derived as described in

Section 3.1.2 above, as well as additional criteria deemed by the reviewer to be pertinent to the special study. All of the special studies developed by Ebasco for resolution of external source issues were reviewed by the Third Party. A selection of special studies and generic calculations supporting their procedures were also reviewed.

The specific Ebasco special studies and generic calculations that were reviewed and the corresponding DAP documentation are listed in Attachment C.

### 3.1.6 Test Programs Review

#### Introduction

A series of test programs were performed by Project in support of the conduit/supports design validation program. These tests were performed to resolve external source issues and to provide information and data required for specific component qualification.

The tests were defined and controlled by test specifications. Three tests were performed by *Corporate Consulting and Development Company, Ltd.* (CCL) and were as follows:

- Static tests of Unistrut supports and components
- Static and cyclic tests of conduit clamps
- Static and cyclic tests of conduit couplings

One additional test has been defined to investigate the dynamic behavior of conduit clamps. This test is being performed by *Anco Engineers, Inc.* (ANCO). None of the results of this test are currently used as a basis for conduit/supports design validation and, as such, this test is not included in the scope of Third Party review.

In all cases, the organization performing the testing developed their test procedures from the test specifications, conducted the tests, and produced test reports. The CCL test results have been used by Ebasco in related studies and/or have been incorporated into their procedures for design validation.

#### Review Methodology

The Third Party review of the static tests of Unistrut supports and components included the review of the test procedures and results. The Third Party review of the CCL static and cyclic tests of conduit clamps included review of the test procedures and results. For the static and cyclic tests of the conduit couplings, the Third Party review included only the test specification and test procedure. These Third Party reviews were performed using engineering evaluations.

The test specifications and procedures were evaluated for their capability of achieving specified objectives of the test programs. The results were reviewed to verify that the tests were performed in accordance with the procedures and that required data are documented in the test reports. Ebasco studies of test results were also reviewed by the Third Party as described in Section 3.1.5.

The specific test program documents that were reviewed and the corresponding DAP documentation are listed in Attachment C.

### 3.1.7 Issue Resolution Review

The Third Party activities associated with the review of external source issue resolution methodologies included the review of Ebasco procedures, special studies, generic calculations, and test program results as they relate to each issue group. These reviews were performed as an integrated part of the Third Party review activities previously described in Sections 3.1.3 through 3.1.6.

## 3.2 Results

The results of the Third Party review are described separately for each overview activity in the following sections.

### 3.2.1 External Source Issues Identification

From the review of external source documents listed in Attachment A, approximately 60 issues related to conduit/supports were identified. Most of these issues were identified from the review of Cygna documents generated as part of the IAP. A number of the same issues and a few additional issues were also identified in ASLB proceedings transcripts, the NRC CPSES Safety Evaluation Report, and public meeting transcripts.

The external source issue groups were established based on the 29 groupings that Cygna had used, since their documents were the primary source of all issues and provided the most comprehensive description of conduit/supports issues. The issue groups and the corresponding DIRs that were generated to document and track the issues are presented in Attachment B. It is noted that a specific DIR number may appear under more than one issue group. This indicates that certain aspects of the issue relate to different groups.

The external source issues can be classified into two broad categories of concerns:

- concerns that a specific FSAR technical commitment, industry code or standard requirement, or regulatory position was not implemented in design methods, and
- concerns that as-built conditions were not adequately reconciled with the design.

There is sufficient information for each concern in the public record (documents listed in Attachment A) to enable the Third Party to delineate each issue. The list of documents reviewed is extensive and some repetition exists, providing a high degree of assurance that all external source issues/concerns have been identified.

### 3.2.2 Design Criteria/Commitments Identification

The design criteria for conduit/supports explicitly delineated in the CPSES criteria and commitment source documents were determined to be consistent with the expected level of detail generally provided in the industry in such documents for conduit/supports. Many of the detailed criteria were derived from the AISC and AISI specifications that were specified in the FSAR as the governing documents for structural steel design.

Based on the results of the Design Criteria review documented in Checklist DAP-CLA-C/S-012 [*Ref. 7.4.3*], the Third Party concluded that the Criteria List (DAP-CR-C/S-001) [*Ref. 7.4.2*], together with the extraction of detailed criteria from the committed codes and standards, provides a complete, consistent, and adequate set of design criteria for conduit/supports.

### 3.2.3 As-Built Procedures Review

The results of the Third Party review of the TU Electric engineering walkdown procedures for Unit 1 and Unit 2 are documented in Engineering Evaluations DAP-E-C/S-301 and DAP-E-C/S-302 [*Refs. 7.4.12 and 7.4.13*]. These reviews identified apparent discrepancies which were documented in DIRs and communicated to Project. All Third Party concerns related to the as-built procedures have been satisfactorily resolved by Project.

The results of the Third Party review of the Project's methods for determining attribute documentation coverage and for dispositioning inaccessible conduit/supports attributes are documented in DAP-E-C/S-309 and DAP-E-C/S-310 [*Refs. 7.4.20 and 7.4.21*]. All Third Party concerns related to inaccessible attributes have been satisfactorily resolved by the Project.

In summary, it is concluded that the engineering walkdown procedures are adequate and if properly implemented, will result in obtaining attributes for design validation of conduits/supports that accurately represent as-built conditions at the CPSES.

### 3.2.4 Design Validation Procedures Review

The results of the Third Party review of Ebasco's procedures are documented in completed checklists and engineering evaluations. The principal Ebasco design validation activities are summarized in Engineering Evaluations DAP-E-C/S-305, DAP-E-C/S-307, DAP-E-C/S-311, DAP-E-C/S-312, DAP-E-C/S-313, and DAP-E-C/S-314 [*Refs. 7.4.16, 7.4.18, 7.2.22, 7.4.23, 7.4.24 and 7.4.25*]. Additional procedures and the corresponding Third Party documentation are listed in Attachment C.

The review consisted of several cycles of procedure review performed as new revisions were issued. A number of apparent discrepancies were identified as a result of these reviews, documented in DIRs and communicated to Project. All Third Party concerns related to Ebasco's design validation procedures have been satisfactorily resolved through procedure revisions or Ebasco's provision of justifying information.

In summary, it is concluded that Ebasco's design validation procedures are adequate and, if properly implemented, will fulfill FSAR and licensing commitments.

### 3.2.5 Special Studies and Generic Calculations Review

The Third Party review of special studies and generic calculations performed by Ebasco are documented in checklists and engineering evaluations. The specific studies and generic calculations reviewed and the corresponding Third Party documentation are listed in Attachment C.

Concerns raised by these reviews were documented in DIRs and communicated to Project. All DIRs have been satisfactorily resolved either through revisions to the pertinent special studies, the associated procedures, generic calculations, or Ebasco's provision of other justifying information.

In summary, it is concluded that the special studies performed by Ebasco provide the information needed to support the use of their design procedures and/or adequately resolve specific external source issues.

### 3.2.6 Test Programs Review

The Third Party review of test procedures and results is documented in Engineering Evaluations DAP-E-C/S-304, DAP-E-C/S-308, and DAP-E-C/S-316 [*Refs. 7.4.15, 7.4.19 and 7.4.27*]. Third Party review of test procedures determined that the objectives of the test programs were met. Third Party evaluation of test reports determined that the test procedures were executed properly and that the test results are accurately presented and are sufficient to meet the test program objectives. Studies and evaluations of the test results made by Ebasco were also reviewed by the Third Party and are listed in Attachment C together with the corresponding Third Party documentation.

In summary, it is concluded that the conduit/supports test programs have been performed adequately and provide the data required for design validation and issue resolution.

### 3.2.7 Issue Resolution Review

The results of the Third Party review of the Project's methodology for the resolution of external source issues are presented in individual subsections below for each of the 29 issue groups. These include a description of the issue, a description of the Project's resolution methodology, a discussion of the Third Party evaluation, and a conclusion.

For clarity of presentation, specific references to Project documents reviewed and the corresponding Third Party documents that detail the issue resolution are often omitted in the text. Instead, these documents are listed in Attachment C and cross-referenced to each external source issue as appropriate. This cross-referencing is limited to those documents which serve as the primary basis for issue resolution.

#### 3.2.7.1 Governing Load Case for Design

*ISSUE DESCRIPTION*

In the original design of CPSES conduit supports, the Operating Basis Earthquake (OBE) was assumed by Gibbs & Hill to be the governing seismic load case for all support components (e.g., members, welds, and anchorages). This assumption was based on the 60% increase in OBE allowables permitted by the FSAR [*Ref. 7.1.1*] for Safe Shutdown Earthquake (SSE) design of most structural steel components. Concerns have been raised regarding the use of the OBE as the governing load case, since the 60% increase in allowables is not appropriate for some support components (e.g., Richmond Inserts and Hilti expansion anchors).

*RESOLUTION METHODOLOGY*

Ebasco addressed this issue by validating the design of all conduit and junction box supports and their components for both OBE and SSE load cases.

*THIRD PARTY EVALUATION*

The Third Party review of Ebasco's design criteria [*Refs. 7.2.1, 7.2.2, 7.2.3, and 7.2.4*] confirmed that the design of all conduit and junction box supports and their components are required to be validated for both OBE and SSE load cases.

*CONCLUSION*

Ebasco's design validation of supports for both the OBE and SSE load cases adequately addresses the concerns raised in this issue. The issue of governing load case for design is closed.

### 3.2.7.2 Dynamic Amplification Factors

*ISSUE DESCRIPTION*

In the original design of conduit supports, Gibbs & Hill determined the seismic response using an equivalent static analysis with a dynamic amplification factor (DAF) of 1.0 times the peak of the governing design spectrum. Since the FSAR [*Ref. 7.1.1*] required a DAF of 1.5, concerns have been raised regarding the use of a DAF of 1.0. Additional justification is needed.

*RESOLUTION METHODOLOGY*

The conduit support designs have been validated by the Equivalent Static Method (ESM) using a DAF. If the conduit system frequency is less than or equal to the frequency at the spectrum's peak, the seismic response is determined by multiplying the peak ordinate of the design spectrum by a DAF of 1.5. If the conduit system frequency is greater than the frequency at the spectrum's peak, the seismic response is determined by multiplying the design spectrum ordinate at that frequency by a DAF of 1.25.

Response spectrum analyses that envelope the combination of conduit configurations and span lengths allowed by S-0910 and S2-0910 generic drawing packages [*Refs. 7.2.112 and 7.2.113*] have been performed to justify a DAF of 1.25. The analyses have generally confirmed the applicability of the DAF used for the systems under consideration. However, certain span combinations resulted in dynamic amplification factors higher than that utilized. For these cases, the design accelerations have been increased to reflect the results of the response spectrum analyses.

The design of electrical junction boxes has been validated by using the ESM with 1.5 times peak spectral acceleration or by using a Response Spectrum Method (RSM) analysis.

*THIRD PARTY EVALUATION*

The Third Party review of Ebasco's design criteria [*Refs. 7.2.1 and 7.2.2*] confirmed their commitment to justify DAFs less than 1.5 by performing enveloping response spectrum analyses. Ebasco's design procedures [*Refs. 7.2.7 and 7.2.16*] provide appropriate guidelines to perform systems analyses and to confirm the DAF used in the ESM. The Third Party review of Ebasco's junction box design criteria [*Refs. 7.2.3 and 7.2.4*] confirmed that appropriate seismic input is being used for junction box qualification.

The Third Party review of Ebasco's generic calculations [*Refs. 7.2.76, 7.2.77, 7.2.78, 7.2.97, 7.2.98, 7.2.103, 7.2.104*] confirmed that the DAF used in the ESM analysis of conduit supports for conduit configurations and span lengths given in the S-0910 and S2-0910 generic drawing packages have been justified by performing enveloping response spectrum analyses.

*CONCLUSION*

Ebasco's generic calculations procedures and related generic calculations adequately address all concerns raised by this issue. The issue of dynamic amplification factors is closed.

### 3.2.7.3 Combination of Deadweight and Seismic Response

*ISSUE DESCRIPTION*

In the Gibbs & Hill calculations, a 1.0g acceleration for dead load was added to the vertical seismic acceleration. The response to this loading was then improperly combined with the response to the horizontal seismic acceleration components using the SRSS method.

*RESOLUTION METHODOLOGY*

Ebasco adds the dead load response to the SRSS combination of the three orthogonal seismic response components considering both the positive and negative sign of the seismic resultant.

*THIRD PARTY EVALUATION*

The Third Party review of Ebasco's design criteria and guidelines [*Refs. 7.2.1, 7.2.2, 7.2.3, 7.2.4, 7.2.11, and 7.2.15*] confirmed that the dead load is required to be added algebraically to the SRSS combination of responses to the three orthogonal seismic components.

*CONCLUSION*

Ebasco's design validation procedures adequately address the issue of combination of deadweight and seismic response. This issue is closed.

### 3.2.7.4 Measurement of Embedment from Top of Topping

*ISSUE DESCRIPTION*

Note 5a on Sheet G-4a of the original S-0910 drawings [*Ref. 7.2.112*] allowed the 2-inch concrete topping thickness to be considered in determining the embedment length of anchor bolts at certain locations. The concern raised was that the integrity of the concrete topping cannot be assured and that the Gibbs & Hill calculations have not considered the reduced anchor bolt embedment. This issue applies to Unit 1 and common areas only.

*RESOLUTION METHODOLOGY*

All supports with anchor bolts located in 2-inch concrete topping are being identified and design validated with a 2-inch reduction of embedment length. Anchor bolts embedded only in concrete topping and those that do not meet the anchor bolt acceptance criteria are being replaced.

*THIRD PARTY EVALUATION*

The Third Party review of Ebasco's design criteria [*Ref. 7.2.2*] confirmed the requirement to exclude the 2-inch concrete topping in the determination of embedment length for anchor bolts. The Third Party review of the walkdown procedures [*Refs. 7.1.4 and 7.1.5*] confirmed that adequate instructions have been given to identify and determine the embedment of anchor bolts.

*CONCLUSION*

Ebasco's approach to resolution of this concern is acceptable. The issue of measurement of embedment from top of concrete topping is closed.

### 3.2.7.5 Bolt Hole Tolerance and Edge Distance Violation

*ISSUE DESCRIPTION*

Concerns were raised regarding bolt hole tolerances and edge distances used in the original Gibbs & Hill designs. The specific concerns are as follows:

- **Bolt Hole Tolerance** - The original S-0910 drawings [*Ref. 7.2.112*] allow bolt hole tolerances that vary with the bolt size. However, the AISC Specification [*Ref. 7.5.1*] does not specify bolt hole tolerances, but does allow bolt hole diameters to be 1/16 inch larger than the corresponding nominal bolt diameters. Therefore, the bolt holes in the Gibbs & Hill designs should be considered oversized and should be treated as such in bearing connection calculations.
- **Edge Distance Violation** - The AISC Specification [*Ref. 7.5.1*] requires an increase in edge distance for oversized bolt holes over that required for standard bolt holes. Some Gibbs & Hill designs do not provide the minimum edge distance required in the AISC Specification for oversized bolt holes.

*RESOLUTION METHODOLOGY*

The following methods were used by Ebasco to address the concerns discussed above:

- **Bolt Hole Tolerance**
  - Few steel-to-steel bolted connections are present in conduit supports since welded configurations are predominant. Critical two-bolt steel-to-steel connections have been investigated [*Ref. 7.2.42*] with regard to the effect of bolt hole oversize and have been found to be adequate.
  - For base-plate-to-concrete connections, Ebasco obtained a determination from AISC [*Ref. 7.5.3*] that the provisions of the AISC Specification [*Ref. 7.5.1*] are intended for steel-to-steel connections and do not apply to base plates. However, Ebasco has generically considered the effect of oversized bolt holes on these connections in the cable tray hanger design validation program. The cable tray hanger study [*Ref. 7.2.52*] was extended to address the oversize bolt hole issue for conduit supports. These studies conclude that the effects of oversized bolt holes are not significant and can be ignored in design validation of base angles and base plates of conduit supports.
  - The effect of oversize bolt holes in critical connections of individuallly designed supports is addressed on a case-by-case basis.
- **Edge Distance Violation**
  - For steel-to-steel connections and steel-to-concrete connections, Ebasco performed special studies [*Refs. 7.2.40 and 7.2.75*] to evaluate the effects of edge distance violations. These studies concluded that violation of minimum edge distances as allowed by design does not lower the capacity of conduit supports. Violations beyond those permitted by design are being evaluated during the support design validation.
  - For conduit clamps, testing has been performed to establish allowable capacities for design validation. The tests (see also Section 3.2.7.18) are representative of as-built conditions, including edge distance violations.

*THIRD PARTY EVALUATION*

The Third Party reviews of the Ebasco procedures and studies that address the oversized bolt hole and edge distance issues are discussed below.

- **Bolt Hole Tolerance**
  - The Third Party review of Ebasco's special study on oversized bolt holes in steel-to-steel connections [*Ref. 7.2.42*] confirmed that the effects of bolt hole oversize have been appropriately considered.
  - The Third Party concurs with the findings of Ebasco's special studies for steel-to-concrete connections [*Refs. 7.2.42, 7.2.52, and 7.2.74*] which concluded that the effects of oversized bolt holes can be ignored in design validation of base angles and base plates of conduit supports.
  - The Third Party review of Ebasco's technical guidelines [*Refs. 7.2.11 and 7.2.15*] confirmed that adequate instructions are in place to evaluate the impact of oversized bolt holes on individually designed support connections.
- **Edge Distance Violation**
  - The Third Party review of Ebasco's special studies for steel-to-steel and steel-to-concrete connections [*Refs. 7.2.40 and 7.2.75*] confirmed that violation of minimum edge distance allowed by design does not lower the capacity of conduit supports. The Third Party review of the walkdown procedures [*Refs. 7.1.4 and 7.1.5*] confirmed that adequate instructions have been given to gather information necessary to calculate edge distance. The Third Party review of Ebasco's technical guidelines [*Ref. 7.2.11*] confirmed that adequate instructions are in place to evaluate edge distance violations.
  - The Third Party review of the static and cyclic test of clamps at CCL [*Refs. 7.3.3 and 7.3.4*] indicates that the effect of reduced edge distances has been addressed. The test results have been properly utilized to establish clamp capacities for design validation.

*CONCLUSION*

Ebasco's design validation procedures and related special studies and tests adequately address all concerns raised in this issue. The issue of bolt hole tolerance and edge distance violation is closed.

### 3.2.7.6 FSAR Load Combinations

*ISSUE DESCRIPTION*

A concern was raised that the loads that result from normal operating and accident temperatures as well as from jet impingement and pipe whip have not been explicitly considered in the conduit support design. Furthermore, the design accelerations that envelope the Containment Building and Internal Structure Spectra have not been used for the design verification of conduit systems.

*RESOLUTION METHODOLOGY*

The TU Electric Systems Interaction Program has the responsibility for identification of safety-related conduit runs that are susceptible to loads resulting from pipe-whip, jet impingement, and missiles (including tornado missiles, wind, etc.). Ebasco has the responsibility for mitigating the

effects of such loading on these conduit runs, either by relocating the conduit or by notifying the Civil/Structural Corrective Action Program (C/S-CAP) that shielding is required.

A generic study of the thermal effects on conduit supports and junction boxes has been performed to demonstrate that concrete anchorages are not loaded beyond their allowable capacities for normal operating thermal conditions and remain within their ultimate deflection capabilities for the accident case.

Design "g" values for support capacity validation have been established per building and elevation for Unit 1. For Unit 2, the design "g" values envelope acceleration values for groups of floor elevations.

*THIRD PARTY EVALUATION*

The Third Party review of Ebasco design criteria [*Refs. 7.2.1, 7.2.2, 7.2.3 and 7.2.4*] has confirmed that appropriate load combinations are being used by Ebasco. The Third Party concurs that appropriately designing, shielding or re-routing of all conduits potentially affected by postulated pipe-whip, jet impingement, missiles or wind loads adequately resolves concerns for these loads.

The Third Party has reviewed the differential temperatures for operating and accident cases given in the technical guidelines for thermal analysis [*Refs. 7.2.8 and 7.2.9*]. These differential temperatures are conservative and consistent with CPSES criteria. The accident differential temperature is justified by thermal studies summarized in Appendix A of the technical guidelines for thermal analysis [*Refs. 7.2.8 and 7.2.9*].

The Third Party review of generic studies [*Refs. 7.2.45, 7.2.46, 7.2.47, 7.2.48, 7.2.49, 7.2.60, 7.2.61, 7.2.62, 7.2.63, 7.2.64, 7.2.65, 7.2.66, 7.2.68, and 7.2.69*] confirmed that conduit supports are acceptable for the operating thermal load case.

The Third Party review of the generic study [*Ref. 7.2.67*] for the accident thermal load case confirmed that the concrete expansion anchors used for most of the generic support types and junction boxes will have an adequate minimum safety margin against ultimate displacement. For certain support types and conduit configurations, Ebasco will perform a case-by-case thermal expansion analysis. The Third Party review of Ebasco's technical guidelines [*Refs. 7.2.10 and 7.2.14*] confirmed that adequate guidelines exist for identifying these case-by-case exceptions and performing the appropriate thermal expansion analysis.

The Third Party review of Ebasco design criteria [*Refs. 7.2.1 and 7.2.2*] confirmed that appropriate design "g" values are specified for seismic analysis.

*CONCLUSION*

All applicable loads, as defined in CPSES FSAR are explicitly considered in the conduit/supports design validation. The TU Electric Systems Interaction Program has the responsibility for identifying all conduit runs that are potentially affected by postulated pipe-whip, jet impingement, missles, or wind loads. Ebasco has the responsibility for mitigating the effects of such loading on these conduit runs, either by relocating the conduit or by notifying the C/S-CAP that shielding is required. The thermal aspect of this issue has been addressed by generic studies for operating and accident thermal loads on supports and junction boxes. The design acceleration aspect of this issue has been addressed by Ebasco's methodology for using envelope design "g" values.

The issue of FSAR load combinations is closed, with the understanding that the TU Electric QA Technical Audit program will overview the implementation and the C/S CAP.

### 3.2.7.7 Support Self Weight

*ISSUE DESCRIPTION*

In the original Gibbs & Hill designs, the support loads due to the support self weight were not calculated consistently. The support weight was completely or partially ignored.

*RESOLUTION METHODOLOGY*

Ebasco addressed this issue by consistently and appropriately considering support self weight in all conduit support design validations.

*THIRD PARTY EVALUATION*

The Third Party review of Ebasco's design criteria [*Refs. 7.2.1, 7.2.2, 7.2.3, and 7.2.4*] confirmed that support self weight is required to be included in the analysis of all conduit and junction box supports.

*CONCLUSION*

Ebasco has included consideration of support self weight in their design validation of conduit supports. The issue of support self weight is closed.

### 3.2.7.8 Torsion of Unistrut Members

*ISSUE DESCRIPTION*

Gibbs & Hill did not consider torsional loading of Unistrut members in the original conduit support designs. Since the manufacturer does not support the use of Unistrut shapes for torsional loading and since analysis of the asymmetrical Unistrut sections is difficult, a testing program was initiated to qualify the supports using these members.

The selection of testing configurations, establishing loading magnitude and directions, test grouping, loading in the clamp assembly, the effect of applicable generic and support-specific design changes are questioned in the qualification test program.

This issue applies to Unit 1 and common areas only since there are no Unistrut supports in Unit 2.

*RESOLUTION METHODOLOGY*

Ebasco addressed this issue by 1) evaluating the test results against all applicable concerns, 2) performing calculations to reduce the test data to results that can be used in the evaluation of supports, and 3) replacing those Unistrut supports that exhibited significant reduction in capacity. As a result of this effort, all Unistrut supports except CA-1, CA-2, CA-8, JA-1, JA-2 and JA-3 series will be replaced. CA-type and JA-type supports consist of Unistrut or structural steel sections attached directly to concrete that support conduit and junction boxes, respectively. This resolution pertains to Unistrut sections only.

*THIRD PARTY EVALUATION*

The Third Party review of the CCL Unistrut test program [*Ref. 7.3.2*] and Ebasco support capacity calculations for the CA-type and JA-type Unistrut supports [*Refs. 7.2.109, 7.2.110, and 7.2.111*] confirmed that conservative capacities are being used for those Unistrut configurations that are not being replaced. The Unistrut testing program was not intended to qualify the clamps used in the tests. Clamp-related concerns are addressed in the CCL clamp testing program [*Refs. 7.3.3 and 7.3.4, see Section 3.2.7.18*].

*CONCLUSION*

Ebasco has adequately addressed the concerns raised under this issue. The issue of Unistrut members loaded in torsion is closed.

### 3.2.7.9 Improper Use of Catalog Components

*ISSUE DESCRIPTION*

Concerns were raised regarding the use of catalog components in the original Gibbs & Hill design of conduit supports. The following is a summary of these concerns.

- **AISC Derived Allowables** - The AISI Code [*Ref. 7.5.2*], rather than the AISC Specification [*Ref. 7.5.1*], should be used for thin wall structural members such as Unistrut.
- **Components Used in Ways Not Intended by the Vendors** - Various Unistrut components and Superstrut clamps were used in non-standard configurations, i.e., the application of these particular components was not consistent with the use intended by the vendor. As such, the components were subjected to load conditions for which there were no published allowable capacities.

*RESOLUTION METHODOLOGY*

Ebasco has addressed this issue by analyzing each generic support using the proper design code, i.e., the AISC Specification [*Ref. 7.5.1*] for structural shapes and the AISI Code [*Ref. 7.5.2*] for Unistrut sections. The capacities of Unistrut-type supports that are not being replaced have also been determined by tests (see Section 3.2.7.8) supplemented by analysis. Allowables for catalog components, if not supplied by the manufacturer, have also been established by test, or else the catalog component has been replaced with a qualified component. An exception is the allowable loads for the Nelson studs that are not used in conduit clamps. These allowables are derived by treating them as threaded fasteners in accordance with the AISC Specification (see Section 3.2.7.20).

*THIRD PARTY EVALUATION*

The Third Party review of Ebasco's design criteria [*Refs. 7.2.1 and 7.2.2*] confirmed that the proper design codes are being used in the design of conduit supports.

The Third Party review of the CCL Unistrut test program [*Ref. 7.3.2*] and Ebasco support capacity calculations for the CA-type and JA-type Unistrut supports [*Refs. 7.2.109, 7.2.110, and 7.2.111*] confirmed that conservative capacities are being used for those Unistrut supports which were tested and will remain as conduit and junction box supports. All Unistrut supports not

qualified by test will be replaced (See also Section 3.2.7.8 which defines CA-type and JA-type supports).

The Third Party review of static and cyclic tests of conduit clamps [*Refs. 7.3.3 and 7.3.4*] confirmed that the tests are representative of as-built conditions and are sufficient for developing design allowable capacities.

For Third Party review of the Nelson stud issue, refer to Section 3.2.7.20.

*CONCLUSION*

Ebasco has adequately addressed all concerns raised by this issue. The issue of improper use of catalog components is closed.

### 3.2.7.10 Anchor Bolts

*ISSUE DESCRIPTION*

Concerns were raised regarding Gibbs & Hill bolt designs. The following is a summary of these concerns.

- **Prying Factors** - The prying factors for anchor bolt tension were not treated consistently and were not technically justified.
- **CST-17 Type 17 Supports** - The design of concrete connections for conduit support CST-17, Type 17 (transverse cantilever supports), did not consider the additional moment induced by the 3-1/2 inch eccentricity. This type of support is used in Unit 1 only.
- **CA-2a Supports** - Outrigger Hilti Kwik bolts for CA-2a supports were assumed not to take any load (CA-type supports are defined in Section 3.2.7.8). Because of this assumption, the design drawing waives separation violations between the Hilti bolts in the outriggers and other bolts. This design assumption may not be valid. This type of support is used in Unit 1 only.
- **Substitution of Richmond Inserts** - Note 3 on Sh. G-4a of the S-0910 package and Note 7 on Sh. G-3b of S2-0910 package allow the substitution of Richmond inserts for Hilti bolts provided that Note 2 on Sh. G-4a and Note 6 on Sh. G-3b, respectively, remain satisfied. This substitution may result in lower bolt/insert capacities than in the original design.

*RESOLUTION METHODOLOGY*

The responsibility of resolving concerns related to Gibbs & Hill's "Structural Embedments" Specification 2323-SS-30 has been assigned by TU Electric to the Civil/Structural portion of the Corrective Action Program, which is being performed by Stone and Webster Engineering Corporation (SWEC). The following summarizes Ebasco's resolution of other concerns raised with respect to anchorage and/or bolt design:

- **Prying Factors** - Prying factors have been established for various generic sizes of base angles and base plates through a finite element analysis that considers base angle or base plate stiffness, anchor bolt stiffness, and concrete stiffness. The prying factors have been specified in the design validation procedures [*Refs. 7.2.11 and 7.2.15*]. When the generic sizes of base angles and baseplates are not applicable, an individual analysis is being performed.

- **CST-17, Type 17 Supports** - All of these types of supports are being replaced or removed.
- **CA-2a Supports** - Capacities of the CA-2a supports have been established by test. Revised Ebasco drawings do not permit the use of outriggers with CA-2a supports. The calculations which established the allowables for CA-type supports from the test results have considered potential Hilti bolt spacing violations.
- **Substitution of Richmond Inserts** - All supports will be evaluated in their as-built condition for the impact of substitution of Richmond Inserts. Design criteria for both units requires evaluation of spacing violations between Hilti Kwik bolts and Richmond Inserts.

*THIRD PARTY EVALUATION*

- **Prying Factors** - The Third Party review of Ebasco design criteria [*Refs. 7.2.1, 7.2.2, 7.2.3, and 7.2.4*] confirmed that acceptable methods are specified for evaluation of prying action on bolts.

  The Third Party review of Ebasco's Unit 2 special study for conduit support anchorage [*Ref. 7.2.58*] confirmed that an acceptable approach was used to establish prying factors. These results have been incorporated in Ebasco's technical guidelines for Unit 2 [*Ref. 7.2.15*].

  The Third Party review of Ebasco technical guidelines for Unit 1 [*Ref. 7.2.11*] confirmed that prying factors have been included for generic sizes of base angles and baseplates and that an acceptable approach has been specified to evaluate other types. The prying factors included in the technical guidelines are taken from an Ebasco cable tray hanger special study [*Ref. 7.2.121*]. The Third Party review of this document is discussed in DAP-RR-C/S-001 [*Ref. 7.4.11*].
- **CST-17, Type 17 Supports** - The Third Party confirmed that these supports are being replaced or removed.
- **CA-2a Supports** - The Third Party review of the CCL Unistrut test program [*Ref. 7.3.2*] and Ebasco support capacity calculations for the CA-type Unistrut support [*Refs. 7.2.109 and 7.2.110*] confirmed that conservative capacities have been determined for these supports. These calculations take the test results divided by an appropriate factor of safety and consider potential Hilti spacing violations.
- **Substitution of Richmond Inserts** - The Third Party review of Ebasco's design criteria [*Refs. 7.2.1. and 7.2.2*] has confirmed that selected portions of 2323-SS-30 have been incorporated directly into the criteria for evaluation of Richmond Inserts. Hence, pertinent sections of Ebasco's design criteria will require revision if the C/S-CAP revises or supersedes the technical content of 2323-SS-30. The Third Party review of the walkdown procedures [*Refs. 7.1.3, 7.1.4, and 7.1.5*] confirmed that adequate instructions have been given to identify Richmond insert substitutions.

*CONCLUSION*

The C/S-CAP has the responsibility for resolving anchorage and anchor bolt design concerns related to Gibbs & Hill's Specification 2323-SS-30. All other concerns raised by this issue have been adequately addressed by Ebasco. The issue of anchor bolts is closed, with the understanding

that the TU Electric QA Technical Audit program will overview the implementation of the C/S-CAP.

### 3.2.7.11 Longitudinal Loads on Transverse Supports

*ISSUE DESCRIPTION*

Concerns were raised that the original Gibbs & Hill conduit support designs did not consider longitudinal loads on transverse supports. The transverse supports may have longitudinal stiffnesses that are similar to those of the longitudinal supports. This issue applies to Unit 1 and common areas only, because in Unit 2, all supports are designed as being multi-directional.

*RESOLUTION METHODOLOGY*

Ebasco will validate the designs of all generic supports as multidirectional supports. All existing transverse supports will be replaced or modified to be multidirectional supports.

*THIRD PARTY EVALUATION*

Third Party review of Ebasco's design criteria [*Refs. 7.2.1 and 7.2.2*] confirmed that the design of all conduit supports is required to be validated for three directions of load.

*CONCLUSION*

Ebasco has adequately addressed the concerns raised under this issue. The issue of longitudinal loads on transverse supports is closed.

### 3.2.7.12 Hilti Kwik Bolt Substitutions

*ISSUE DESCRIPTION*

The original Gibbs & Hill designs allowed substitution of Hilti Kwik bolts and Super Kwik bolts shown on the drawing S-0910 with those of a larger size. A concern was raised that the capacity of the substituted bolt may be less than the original bolt, since the spacing may be smaller than that required.

*RESOLUTION METHODOLOGY*

A complete walkdown of Unit 1 conduit is being performed by Ebasco. Bolt patterns, spacings, sizes, and embedment lengths are being recorded on as-built drawings for every support, thus indicating any bolt substitutions. Design validation of conduit supports will be based on these as-built drawings. The S-0910 drawing package has been revised so as not to allow bolt substitution for future installations.

For Unit 2, the S2-0910 drawing package has been revised to allow certain bolt substitutions which have been justified by generic studies [*Ref. 7.2.72*]. For Unit 2 conduit installed prior to this change, the effect of Hilti Kwik bolt and Super Kwik bolt substitutions will be addressed during the Unit 2 design validation effort [*Ref. 7.2.116*].

*THIRD PARTY EVALUATION*

The Third Party review of the Ebasco special study [*Ref. 7.2.72*] confirmed that certain substitutions have been justified on a generic basis, however, other cases would require individual justification [*Ref. 7.2.116*]. The Third Party review of the walkdown procedures [*Refs. 7.1.3, 7.1.4 and 7.1.5*] confirmed that the procedures specify that an adequate amount of information be gathered to identify Hilti Kwik bolt substitutions.. The Third party review of Ebasco's design criteria [*Refs. 7.2.1 and 7.2.2*] confirmed that adequate guidelines are provided for the evaluation of substitutions that require individual justification.

*CONCLUSION*

The methodology used to address this issue is adequate. The issue of Hilti Kwik bolt substitutions is closed.

### 3.2.7.13 Substitution of Smaller Conduits on CA-Type Supports

*ISSUE DESCRIPTION*

The original Gibbs & Hill drawings allowed smaller diameter conduits to be installed on CA-type supports (CA-type supports are defined in Section 3.2.7.8) unless specifically prohibited by the drawings. Since rigid response was assumed for determining seismic loads for large (> 2-inch) diameter and peak spectral accelerations were used for small (≤ 2-inch) diameter conduits, the equivalent seismic load of the small diameter conduits may exceed those of the large diameter conduits. This issue applies to Unit 1 and common areas only, since there are no CA-type supports in Unit 2.

*RESOLUTION METHODOLOGY*

Ebasco addressed this issue for the two different categories of CA-type supports: Unistrut supports and supports fabricated of structural shapes and plates.

Unistrut supports are being qualified by test or analysis (see Section 3.2.7.8).

The designs of CA-type supports fabricated of structural shapes and plates have been validated using only one set of seismic responses which envelope all conduit sizes. The relevant sections of the S-0910 drawings [*Ref. 7.2.112*] have been updated to provide the proper support capacities.

Walkdowns of the conduit runs will assure that the installed conduit runs conform with the requirements of the updated S-0910 drawings.

*THIRD PARTY EVALUATION*

The Third Party review of Ebasco's design criteria [*Ref. 7.2.2*] confirmed that Ebasco is using only one set of seismic responses for the design validation of conduit supports. (Refer to Section 3.2.7.2 for evaluation of dynamic amplification factors). The Third Party review of the walkdown procedures [*Refs. 7.1.4 and 7.1.5*] confirmed that appropriate procedures are in place to gather the information necessary to address this issue.

The Third Party review of Ebasco's calculation [*Ref. 7.2.84*] and the updated revision of the S-0910 drawings (Rev. CP-1) confirmed that the capacities of CA-type supports fabricated of

structural shapes and plates have been validated using seismic loads based on flexible conduit responses.

*CONCLUSION*

The methodology used to address this issue is adequate. The issue of substitution of smaller conduits on CA-type supports is closed.

### 3.2.7.14 Use of CA-Type Supports in LS Spans

*ISSUE DESCRIPTION*

CA-type supports are used to support LA spans, the length of which is limited to 6 ft. CST-type and CSM-type supports (cantilevered transverse and multi-directional supports, respectively) are used to support LS spans, which can be up to 12 ft in length for transverse spans and 24 ft in length for longitudinal spans. In field installations, when conduits run from walls to equipment in the middle of a room, a transition is made between LA spans and LS spans, i.e., from a shorter span (more rigid) configuration to a longer span (more flexible) configuration.

For CA-type supports, seismic design loads for large diameter conduits (> 2-inch diameter) were based on the assumption of rigid response. Since the conduits were field-run, CA-type supports may be installed adjacent to multi-directional supports. The span between the two supports is considered to be an LA-span, since the span length must not exceed that specified by the design of the CA-type supports. However, the span cannot be assumed to be rigid due to the flexibility of the multi-directional support and the adjacent LS spans.

This issue applies to Unit 1 and common areas only.

*RESOLUTION METHODOLOGY*

Ebasco has addressed this issue by validating the design of all CA-type supports using only one set of seismic responses which envelope all conduit sizes. The LA-spans have been eliminated from the S-0910 package [*Ref. 7.2.112*]; all spans are to be design validated as LS-spans.

A complete engineering walkdown of conduit runs in Unit 1 and common areas is being performed and isometric drawings are being prepared. These isometrics are being evaluated in accordance with the S-0910 package [*Ref. 7.2.112*] and Ebasco technical guidelines [*Ref. 7.2.10*].

*THIRD PARTY EVALUATION*

The Third party review of Ebasco's design criteria [*Ref. 7.2.2*] confirmed that Ebasco is using only one set of seismic responses for the design validation of conduit supports. The Third Party review of the walkdown procedures [*Refs. 7.1.4 and 7.1.5*] confirmed that appropriate procedures are in place to gather the information necessary to address this issue. The Third Party review of Ebasco's technical guidelines [*Ref. 7.2.10*] confirmed that adequate procedures are in place to evaluate the isometrics prepared during the walkdowns.

*CONCLUSION*

The methodology used to address this issue is adequate. The issue of use of CA-type supports in LS spans is closed.

### 3.2.7.15 Stresses in Cable Trays Due to Attached Conduit Supports

*ISSUE DESCRIPTION*

The original Gibbs & Hill designs allowed conduit stubs (Sheet CSD-16 of original Gibbs & Hill S-0910 drawings) to be clamped to the cable tray rails. One concern was raised that the cable tray spans and cable tray supports were not checked for the load imposed by the conduit. Another concern was raised that the cable tray attachment detail and conduit were not designed for an equivalent seismic load which considered the flexibility of the cable tray. This issue applies to Unit 1 and common areas only.

*RESOLUTION METHODOLOGY*

Ebasco is validating the design of conduit attached to cable trays using seismic loads based on 1.5 times peak spectral acceleration. The effect on the cable trays is being evaluated within the Cable Tray/Supports Corrective Action Program.

*THIRD PARTY EVALUATION*

The Third Party review of Ebasco's design criteria [*Ref. 7.2.2*] confirmed that conduit attached to cable trays are required to be design validated using 1.5 times peak spectral acceleration. The identification of conduit attached to cable trays and the evaluation of the associated cable tray stresses are being handled by the Cable Tray/Supports Corrective Action Program.

Third Party review of the cable tray/supports design validation has been performed for the Cable Tray/Supports Corrective Action Program and is documented in DAP-RR-C/S-001 [*Ref. 7.4.11*].

*CONCLUSION*

The methodology used to address this issue is adequate. The issue of stresses in cable trays due to attached conduit supports is closed.

### 3.2.7.16 Increases in Allowable Span Lengths

*ISSUE DESCRIPTION*

In the revised Gibbs & Hill S-0910 drawings, LA span lengths (spans designed for rigid response, i.e., natural frequency >33Hz) were increased by the ratio of the refined to the unrefined spectra. The conduit stresses were not evaluated for the increased span length. This issue applies to Unit 1 and common areas only.

*RESOLUTION METHODOLOGY*

Ebasco evaluated all conduit bending stresses for LS span lengths (flexible spans) using the provisions of their design criteria [*Ref. 7.2.2*] and technical guidelines [*Ref. 7.2.7*]. LA spans have been eliminated from the S-0910 package.

*THIRD PARTY EVALUATION*

The Third Party review of Ebasco's design criteria [*Ref. 7.2.2*] and technical guidelines [*Ref. 7.2.7*] confirmed that appropriate criteria and procedures have been specified for design validating conduit spans. LA spans have been eliminated from the S-0910 package; all spans are being design validated as LS spans.

*CONCLUSION*

Evaluation of conduit bending stresses for the LS span lengths adequately addresses the concerns raised in this issue. The issue of increases in allowable span lengths is closed.

### 3.2.7.17 Substitution of Next Heavier Structural Member

*ISSUE DESCRIPTION*

A note on the original Gibbs & Hill S-0910 drawings [*Ref. 7.2.112*] allowed substitution of the next heavier member for the member shown on the conduit support drawings. Since support self weight has not been properly considered in some designs (see Section 3.2.7.7), components of the support may be overstressed. The issue applies to Unit 1 and common areas only.

*RESOLUTION METHODOLOGY*

All conduit runs are being walked down. Cases where the next heavier member has been substituted, except for tube steel members, are being noted. Since the tube steel thickness cannot be determined during these walkdowns, a special study has been performed to evaluate the effect of substitution of the next heavier member on support capacities. The generic study covers the single cantilever type and L-shape cantilever type supports. Other supports utilizing tube steel sections are being evaluated using the weight of the next heavier member and the sectional properties of the member size shown on the design drawings.

*THIRD PARTY EVALUATION*

The Third Party review of the walkdown procedures [*Refs. 7.1.4 and 7.1.5*] confirmed that the procedures specify that an adequate amount of information be gathered to identify and evaluate supports where the next heavier member has been substituted. The Third Party review of Ebasco's special studies [*Refs. 7.2.30 and 7.2.41*] confirmed that the effects of the next heavier tube steel substitution on support capacities have been properly assessed. The Third Party review of Ebasco's technical guidelines for isometric evaluation [*Ref. 7.2.10*] confirmed that the results and limitations of the special studies [*Ref. 7.2.30 and 7.2.41*] have been properly included.

*CONCLUSION*

Ebasco's walkdown procedures, special studies, and technical guidelines adequately address the concerns in this issue. The issue of the substitution of the next heavier structural member is closed.

### 3.2.7.18 Clamp Usage

*ISSUE DESCRIPTION*

The following concerns were raised with respect to clamp usage:

- **Clamp Modifications** - Unistrut P2558 clamps may be reamed to accommodate larger diameter bolts. As a result of reaming the clamps, minimum edge distance requirements were violated and the washers for the larger diameter Hilti Kwik bolts will not fit properly.
- **Modification of C708-S Clamps** - The C708-S clamps were modified by cutting off a portion of the clamp ears. Justification for this modification was not provided.

- **Clamp Distortion** - Clamp distortion was noted on four conduit supports.

*RESOLUTION METHODOLOGY*

- **Clamp Modifications** - A conduit clamp testing program by CCL [*Refs. 7.3.3 and 7.3.4*] determined allowables for the clamps used for conduit supports. The test program considered the effect of oversized bolts, edge distance violation, bolt type and size, and distortion of clamps. Ebasco reviewed these test results and incorporated them into the design criteria for conduit supports.
- **Modification of C708-S Clamps** - The conduit clamp testing program by CCL [*Ref. 7.3.3 and 7.3.4*] was used to determine allowables for the C708-S clamps considering the modifications allowed by the original Gibbs & Hill drawings [*Refs. 7.2.112 and 7.2.113*]. Ebasco reviewed these tests results and incorporated them into the design criteria for conduit supports.
- **Clamp Distortion** - The CCL test program has considered clamp distortion as a parameter for all clamps. With the exception of clamps anchored with 1/4-inch anchor bolts, the test programs produced results for potential clamp distortions in excess of design tolerances. For clamps anchored with 1/4-inch anchor bolts, the test program determined that a decrease in bolt spacing in excess of the design tolerance resulted in loss of longitudinal restraint. These clamps will be inspected during the Post Construction Hardware Validation Program (PCHVP) to assure that they meet the required tolerances or are appropriately modified.

*THIRD PARTY EVALUATION*

The Third Party review of the CCL test program [*Ref. 7.3.3 and 7.3.4*] confirmed that the tests met their objectives and were representative of as-built conditions, including clamp modifications and clamp distortion. The Third Party review of Ebasco's special study [*Ref. 7.2.34*] for clamp allowables confirmed that the test results have been properly interpreted. The Third Party review of Ebasco's design criteria [*Refs. 7.2.1 and 7.2.2*] confirmed that the results of the CCL test program [*Ref. 7.2.34*] have been appropriately incorporated in the criteria.

The Third Party review of the walkdown procedures [*Refs. 7.1.3, 7.1.4, and 7.1.5*] confirmed that appropriate procedures are in place to identify clamp information necessary for design validation. The Third Party has also confirmed Ebasco's commitment [*Ref. 7.2.19*] to inspect the 1/4-inch bolt clamps as part of the PCHVP and concurs that this action, when implemented, will adequately address the issue of distortion for these clamps.

The Third Party is aware of recent revisions to a few clamp allowable loads reported by CCL [*Ref. 7.3.5*]. This information has not yet been evaluated by Ebasco.

*CONCLUSION*

Ebasco's clamp testing program, design validation procedures, and commitment to PCHVP inspections adequately address all concerns raised in this issue. The issue of clamp usage is closed, with the understanding that the TU Electric QA Technical Audit Program will overview the implementation of the PCHVP and possible future incorporation of the revised CCL clamp allowables in the Ebasco design validation procedures.

### 3.2.7.19 Documentation Deviations between Inspection Reports, CMC's and IN-FP Drawings

*ISSUE DESCRIPTION*

The following concerns were raised regarding documentation and conduit configuration deviations:

- **Documentation Deviations** - In the original design process, an inspection was performed for each conduit line and documented on a Conduit Line Inspection Report (IR). Deviations were identified between the IR's and the applicable Component Modification Cards (CMC's) and Individually Engineered Fire-Protected conduit and supports (IN-FP) drawings.
- **Conduit Configuration Deviations** - Deviations were identified between the final IR's and the installed conduit configurations.

The issue applies to Unit 1 and common areas only.

*RESOLUTION METHODOLOGY*

Ebasco is performing an engineering walkdown to generate as-built drawings of the conduit runs and supports, including those covered by Thermo-Lag. The design of each individual conduit run is being validated for conformance with the revised S-0910 drawing package.

Ebasco investigated each of the six documentation and conduit configuration deviations identified under this issue. A determination was made that there is no safety significance to any of the identified deviations.

*THIRD PARTY EVALUATION*

The Third Party review of the engineering walkdown procedures [*Refs. 7.1.4 and 7.1.5*] confirmed that adequate procedures have been specified for the preparation of as-built drawings for conduit runs and supports and that Thermo-Lag is to be removed from conduit supports to perform as-building [*Ref 7.2.117*]. The Third Party review of the Ebasco paper on Quality of Construction [*Ref. 7.2.19*] confirmed that adequate documentation exists to quantify the attributes necessary to perform the design validation. The Third Party review of Ebasco's technical guidelines [*Ref. 7.2.10*] confirmed that adequate procedures are in place to quantify inaccessible attributes and to evaluate the isometric drawings prepared during the engineering walkdowns.

The Third Party concurred that the six deviations identified in this issue have no safety significance.

*CONCLUSION*

Ebasco's design validation program adequately addresses the issue of documentation deviations between Inspection Reports, CMCs and IN-FP drawings. This issue is closed.

### 3.2.7.20 Nelson Studs

*ISSUE DESCRIPTION*

In the original Gibbs & Hill conduit support design calculations, Nelson studs were not checked for conformance with vendor specifications and allowables. In subsequent Gibbs & Hill calculations, concerns were raised that the calculations did not account for the flexibility of the clamp and shim plate, relaxation of preload, and eccentricity of the shear load applied to Nelson studs due to the thickness of the shim plate. In addition, the analysis of the clamp shim plate itself was not adequate.

*RESOLUTION METHODOLOGY*

Allowable capacities for clamps using Nelson studs have been established by a CCL testing program [*Refs. 7.3.3 and 7.3.4*]. The testing program simulates actual conduit clamp installations.

The shim plate and structural steel member subjected to stud preload were checked for local stresses using an elastoplastic analysis method.

The allowable loads for Nelson studs that are not used in conduit clamps are determined by treating them as threaded fasteners in accordance with the AISC Specification [*Ref. 7.5.1*].

*THIRD PARTY EVALUATION*

The Third Party review of the CCL clamp tests [*Refs. 7.3.3 and 7.3.4*] confirmed that the testing program adequately addresses the concerns raised by this issue.

The Third Party review of Ebasco's calculation [*Ref. 7.2.99*] confirmed that an appropriate analytical method was used to evaluate the shim plate, welds between the shim plate and supporting member, and local stresses in the supporting member.

The Third Party review of Ebasco's design criteria [*Refs. 7.2.1 and 7.2.2*] confirmed that appropriate Nelson stud pretension forces and a ductility ratio are specified for evaluation of conduit connection details. The criteria specify that allowables for Nelson studs be determined using the provisions of the AISC specification [*Ref. 7.5.1*]. This approach has the concurrence of the vendor [*Ref. 7.2.114*].

*CONCLUSION*

Ebasco's testing program for conduit clamps anchored by Nelson studs, special analysis methods, and use of the AISC Specification [*Ref. 7.5.1*] satisfactorily address this issue. The issue of Nelson studs is closed.

### 3.2.7.21 Conduit Fire Protection Calculations

*ISSUE DESCRIPTION*

The following concerns were raised regarding the Gibbs & Hill calculations for conduits with fire protection insulation:

- **Thermo-Lag Configuration** - The Thermo-Lag weight was calculated assuming a round configuration; however, a square configuration was also used in the field.

- **CA-1a Supports** - The tables of capacities for the CA-1a supports in the engineering instruction do not specify the limits of the support configuration used in the analysis. (CA-type supports are defined in Section 3.2.7.8.)
- **CA-2a Supports** - The calculations state that CA-1a capacities should be used for CA-2a supports. The tabulated capacities in the engineering instruction for the CA-2a supports appear to be in error when compared to the CA-1a capacities.
- **IN-FP Calculations** - The specific concerns on these calculations are as follows:
  - IN-FP drawings do not give support orientation but the calculations assume a limiting configuration for analysis.
  - The effects of CMCs have been neglected in some of the calculations.
  - Capacities of supports were taken from current revisions of the support drawings, whereas, supports were installed and inspected to earlier revisions of the drawings.

This issue applies to Unit 1 and common areas only.

*RESOLUTION METHODOLOGY*

The actual Thermo-Lag configurations of all fire-protected conduit as well as the relevant data for design validation have been as-built during the engineering walkdown. The individual concerns were addressed as follows:

- **Thermo-Lag Configuration and IN-FP Calculations** - All fire-protected conduit and their supports have been individually design validated.
- **CA-1a and CA-2a Supports** - The capacities of CA-1a and CA-2a supports have been revised and validated. Engineering Instruction CP-EI-4.0-4.9 [*Ref. 7.1.6*] has been superceded by the S-0910 drawings [*Ref. 7.2.112*] and the associated technical guidelines [*Ref. 7.2.10*].

*THIRD PARTY EVALUATION*

- **Thermo-Lag Configuration and IN-FP Calculations** - The Third party review of the walkdown procedures [*Ref. 7.1.5*] confirmed that appropriate procedures are in place to obtain the as-built information necessary to address this issue. Further, the Third Party review determined that Thermo-Lag is to be removed from conduit supports to facilitate the as-builting process [*Ref. 7.2.117*]. The Third Party review of Ebasco's design criteria and technical guidelines [*Refs. 7.2.2 and 7.2.10*] confirmed that adequate procedures are in place to quantify inaccessible attributes and to validate the design of fire-protected conduit and conduit supports.
- **CA-1a and CA-2a Supports** - Refer to Section 3.2.7.8 for capacity validation of CA-1a and CA-2a Unistrut supports. The revised capacities have been incorporated in the S-0910 drawings [*Ref. 7.2.112*].

*CONCLUSION*

The methodology used to address this issue is adequate. The issue of conduit fire protection calculations is closed.

### 3.2.7.22 Span Increase for Fire Protected Spans

*ISSUE DESCRIPTION*

Concerns were raised regarding the original Gibbs & Hill designs supporting the allowable conduit spans for fire protected runs. The specific concerns are as follows:

- Allowable Stress Values.
  - Vendor test data was used without justification of the applicability of the test data to the installed conduits.
  - The allowable stress values vary with the nominal conduit size.
  - The maximum of the lowest yield stress determined from vendor test data or an arbitrary minimum of 33 ksi was used without justification to establish allowables for each conduit size.
- Stress Evaluation (applies to Unit 1 and common areas only).
  - In the conduit stress evaluation, a dynamic amplification factor of 1.0 was used without justification.

*RESOLUTION METHODOLOGY*

- **Allowable Stress Values** - Conduit material yield stress has been taken as 25 ksi for all conduit sizes, which conforms to accepted industry practice.
- **Stress Evaluation** - The actual configurations have been as-built for all fire-protected runs. The designs of these conduit runs have been individually validated.

*THIRD PARTY EVALUATION*

- **Allowable Stress Values** - The Third Party review of Ebasco's Unit 1 and 2 conduit design criteria [*Refs. 7.2.1 and 7.2.2*] confirmed that appropriate values of yield stress have been used as the basis for design allowables.
- **Stress Evaluation** - Refer to Section 3.2.7.21 for evaluation of fire-protected runs.

*CONCLUSION*

Ebasco has adequately addressed the concerns raised under this issue. The issue of span increase for fire-protected spans is closed.

### 3.2.7.23 Grouted Penetrations

*ISSUE DESCRIPTION*

The original Gibbs & Hill designs assumed grouted penetrations to be multidirectional supports that carry the entire longitudinal load for straight conduit runs. Calculations were not performed to demonstrate the capability of the penetration to carry the required loads. In addition, the relative stiffnesses of the supports and the concrete penetration were not considered.

*RESOLUTION METHODOLOGY*

Ebasco has considered grouted penetrations to be multidirectional supports. The capacity and support stiffness of grouted penetrations have been addressed by Ebasco in a special study [*Ref.*

*7.2.73*]. In particular, the concern of relative stiffness has been addressed in the analysis by the assumption of fixed end boundary conditions at the grouted penetration.

*THIRD PARTY EVALUATION*

The Third Party review of the Ebasco special study on grouted penetrations [*Ref. 7.2.73*] confirmed that the capacity and stiffness effects of grouted penetrations have been adequately addressed. The Third Party review of Ebasco design criteria [*Refs. 7.2.1 and 7.2.2*] confirmed that adequate procedures are in place to consider grouted penetrations in the design validation of conduit runs.

*CONCLUSION*

Ebasco has adequately addressed the concerns raised under this issue. The issue of grouted penetrations is closed.

### 3.2.7.24 Rigidity of CA-Type Supports

*ISSUE DESCRIPTION*

The original Gibbs & Hill designs did not include stiffness calculations to validate the assumption that the CA-type supports were rigid. (CA-type supports are defined in Section 3.2.7.8.) This issue is applicable to Unit 1 and common areas only.

*RESOLUTION METHODOLOGY*

The Ebasco criteria has specific minimum frequency requirements for all supports. CA-type supports are no longer required to be rigid. Frequencies for the CA-type Unistrut supports and supports fabricated from structural shapes and plates were calculated in the validation of the CA-type support designs.

*THIRD PARTY EVALUATION*

The Third Party review of the CA-type Unistrut support calculations [*Refs. 7.2.109 and 7.2.110*] and a sample calculation on a CA-type support fabricated from structural shapes [*Ref. 7.2.84*] confirmed that Ebasco is calculating support frequencies and comparing them to the requirements set forth in the design criteria [*Ref. 7.2.2*]. Support capacities are being determined so that the frequency requirements of the design criteria are met.

*CONCLUSION*

Evaluation of CA-type supports for frequency requirements adequately addresses the concerns raised by this issue. The issue of rigidity of CA-type supports is closed.

### 3.2.7.25 Enveloping Configurations for Design

*ISSUE DESCRIPTION*

Generic supports have numerous design parameters and tolerances for installation. To be enveloping, the design must be evaluated for the worst case configuration allowed by the drawing. Concerns have been raised that the original Gibbs & Hill generic design calculations

did not consider the most critical support configuration, maximum load eccentricities, installation tolerances, and component substitutions.

*RESOLUTION METHODOLOGY*

Ebasco has validated the design of generic conduit supports considering the most critical support configuration, maximum load eccentricities, and installation tolerances. The effect of component substitutions, Hilti Kwik bolts and next heavier member, are addressed in Sections 3.2.7.12 and 3.2.7.17. Modified and Individually Engineered ("IN") supports are being design validated on a case-by-case basis using as-built data.

*THIRD PARTY EVALUATION*

The Third Party review of Ebasco's design criteria and procedures [*Refs. 7.2.1, 7.2.2, 7.2.11, and 7.2.15*] confirmed that adequate instructions are provided to address the concerns raised under this issue. Further, the Third Party review of various generic support calculations [*Refs. 7.2.79, 7.2.80, 7.2.81, 7.2.82, 7.2.83, 7.2.84, 7.2.91, 7.2.92, 7.2.93, 7.2.94, 7.2.95, 7.2.96, 7.2.99, 7.2.100, 7.2.101, 7.2.102, and 7.2.108*] confirmed that critical support configurations, maximum load eccentricities, and installation tolerances were considered.

*CONCLUSION*

Ebasco has adequately addressed the concerns raised in this issue by design validation of all generic conduit support designs. The issue of enveloping configurations for design is closed.

### 3.2.7.26 Design Drawing Discrepancies

*ISSUE DESCRIPTION*

Concerns were raised that discrepancies and inconsistencies exist between the original generic conduit support drawings and the assumptions and models used in the original generic conduit support design.

This issue applies to Unit 1 and common areas.

*RESOLUTION METHODOLOGY*

Ebasco has addressed this issue by validating all generic conduit support designs and reissuing the generic conduit support drawings.

The designs of all modified and individually-engineered ("IN") supports are being validated based on as-built information, and new drawings are issued for these supports.

*THIRD PARTY EVALUATION*

During the Third Party review of various generic conduit support designs for Units 1 and 2 [*Refs. 7.2.79, 7.2.80, 7.2.81, 7.2.82, 7.2.83, 7.2.84, 7.2.91, 7.2.92, 7.2.93, 7.2.94, 7.2.95, 7.2.96, 7.2.99, 7.2.100, 7.2.101, 7.2.102, and 7.2.108*] the applicable current generic conduit support drawings were compared with the designs. The drawings were found to be consistent with the designs. Further, the Third Party evaluation of the specific items identified by Cygna [*Ref. 7.4.18*] confirmed that these design drawing discrepancies have been addressed.

*CONCLUSION*

Ebasco's design validation program has adequately addressed and corrected the discrepancies and inconsistencies between generic conduit support drawings and generic conduit support designs. The issue of design drawing discrepancies is closed.

### 3.2.7.27 Walkdown Discrepancies

*ISSUE DESCRIPTION*

During the walkdown of conduit supports the following concerns were identified:

- **Clamp Installation** - Clamp distortion and violation of maximum gap between clamp and shim plate were identified.
- **Anchor Bolt Installation** - Hilti bolt proximity violations, differences between field installation of Hilti bolts and design drawings, and improper seating of Richmond Inserts and support base angles were identified.
- **Installation of Structural Steel** - Installation tolerances and maximum member sizes allowed by the design drawings have been exceeded in the field.
- **Installation of Unistrut** - Unistrut nuts were not properly seated, members were substituted and rotated, CSD-1 connection details were skewed and gaps exceeded the maximums allowed by the design drawings, and outriggers are skewed.
- **Conduit/Pipe Interferences** - Pipes and conduit are in contact with conduit supports for other conduit runs.
- **Conduit Placement** - Spacing violations between flexible conduit and conduit being skewed with respect to the tube steel have been identified.

This issue applies to Unit 1 and common areas only.

*RESOLUTION METHODOLOGY*

The following methods were used by Ebasco to address the concerns discussed above:

- **Clamp Installation**
  - Clamp distortion was considered in the clamp tests as discussed in Section 3.2.7.18.
  - Gaps between the clamps and shim plate were not considered by Cygna to be a design deficiency [*Ref. 7.5.4*]. Gaps were inspected as part of the CPRT Quality of Construction Program and found to be acceptable.
- **Anchor Bolt Installation**
  - Hilti bolt proximity violations and construction installation for Hilti bolts and Richmond Inserts were inspected as part of the CPRT Quality of Construction Program, resulting in the identification of adverse trends. The resolution of this issue is being addressed by the C/S-CAP.
  - Gaps between base angles and concrete are being addressed by the Ebasco engineering walkdown.
- **Installation of Structural Steel** - These issues are being addressed by the Ebasco engineering walkdown.

- **Installation of Unistrut**
  - The seating of Unistrut nuts is being addressed in the PCHVP.
  - Member substitution, member rotation, CSD-1 connection details, and skewed outriggers are being addressed by the Ebasco engineering walkdown.
- **Conduit/Pipe Interferences** - Clearances between piping and conduit are being addressed by the C/S-CAP.
- **Conduit Placement** - Spacing violations between flexible conduit and rotation of conduit attachments are being addressed by the Ebasco engineering walkdown.

*THIRD PARTY EVALUATION*

The Third Party review of the walkdown procedures [*Ref. 7.1.4 and 7.1.5*] confirmed that adequate procedures have been specified for preparation of as-built drawings for conduit and supports to address those issues to be resolved by Ebasco's engineering walkdown. As an additional level of assurance, the walkdown procedures provide instructions for documenting potential construction deviations observed during implementation of the walkdown procedures.

The Third Party review of Ebasco's position paper on quality of construction [*Ref. 7.2.19*] confirmed that the issue related to clamp gaps has been addressed by the CPRT Quality of Construction Program. This review also confirmed Ebasco's commitment to address the seating of Unistrut nuts as part of the PCHVP [*Ref. 7.2.120*].

*CONCLUSION*

The C/S-CAP has the responsibility for resolving the anchor bolt installation and conduit/pipe interference concerns. The PCHVP has the responsibility for resolving the concern regarding seating of Unistrut nuts. The concern related to clamp gaps has been addressed by the CPRT Quality of Construction Program. All other concerns raised by this issue have been adequately addressed by Ebasco's walkdown procedures. The issue of walkdown discrepancies is closed, with the understanding that the TU Electric QA Technical Audit Program will overview the implementation of the C/S-CAP and the PCHVP.

## 3.2.7.28 Systems Concept

*ISSUE DESCRIPTION*

For the majority of supports in the original Gibbs & Hill 2323-S-0910 drawings, the design evaluations are being performed for individual supports with applied point loads representing the conduit. Loads from all restrained directions and tributary spans are being applied to the support model. However, for the design evaluation of CA-5a supports (CA-type supports are defined in Section 3.2.7.8) and the CSD-1a detail (Z-clip), the interaction between supports on a conduit run or between the support and the conduit is used to validate the use of reduced loads on the support or connection.

The applicability of the above Gibbs & Hill design assumptions to other supports with similar details was not demonstrated.

*RESOLUTION METHODOLOGY*

The Unistrut supports specifically identified in this issue are to be replaced. Ebasco has used the system concept design approach only for surface-mounted conduit supports with 2-bolt anchorages. These supports have been design validated by considering that the moments due to the longitudinal loads are shared between the conduit and the support according to their stiffnesses. Reactions at the adjacent supports from load coupling are considered to be negligible.

*THIRD PARTY EVALUATION*

The Third Party review of sample calculations for Ebasco's surface-mounted conduit supports with 2-bolt anchorages [*Ref. 7.2.84, 7.2.91, 7.2.93, and 7.2.102*] confirmed that this issue has been adequately addressed.

*CONCLUSION*

Ebasco's calculations for surface-mounted conduit supports adequately address the concerns raised in this issue. The issue of systems concept is closed.

### 3.2.7.29 Cumulative Effect of Review Issues

*ISSUE DESCRIPTION*

A concern was expressed by Cygna that small nonconservatisms resulting from separate issues may have a significant cumulative effect for supports affected by more than one issue.

*RESOLUTION METHODOLOGY*

This issue is inherently being addressed by the comprehensive engineering approach to the design validation of the conduit/supports. The approach varies between Units 1 and 2 because prior to Cygna's IAP review, the Unit 1 conduit was already installed and the Unit 2 installation had just begun.

The Unit 2 conduit is being fully engineered. Isometric drawings are being prepared for each conduit run and are being validated to the requirements of the re-issued S2-0910 drawings [*Ref. 7.2.113*] and Ebasco technical guidelines [*Ref. 7.2.14*].

The Unit 1 conduit runs are being walked down and as-built isometric drawings are being prepared. The conduit runs are being validated for conformance to the requirements of the S-0910 drawings [*Ref. 7.2.112*] and Ebasco technical guidelines [*Ref. 7.2.10*].

The overall design validation program has fully addressed and resolved each of the generic technical issues both individually and collectively, has provided as-built documentation to perform conduit/supports design validation, and has confirmed the adequacy of the design validation approach through testing and extensive analytical studies. This provides reasonable assurance that the margin of safety of the conduit/supports is acceptable.

*THIRD PARTY EVALUATION*

The Third Party concurs that the overall program followed by Ebasco, namely the as-building program, design validation procedures, and confirmatory testing, provides reasonable assurance that CPSES conduit/supports have an adequate safety margin.

*CONCLUSION*

The issue of cumulative effects of review issues is closed.

# 4.0 SELF-INITIATED REVIEW

All of the Third Party review activities required by DSAP VIII for the review of conduit/supports design adequacy are external source issue reviews or corrective action overviews. There are no self-initiated reviews associated with this scope.

# 5.0 CORRECTIVE ACTION

For the purposes of this report, corrective action is defined as Ebasco's implementation of their procedures for the conduit/support scope defined in Attachment 2 of DSAP VIII. This includes obtaining as-built data and validating the design of all of the conduit/supports for Unit 1 and completely engineering the conduit/supports for Unit 2.

The Third Party review of Ebasco's conduit/supports design validation procedures and supporting documentation for overall adequacy and resolution of external source issues is discussed in Section 3.0 of this Report. The Third Party review concluded that these procedures contain the appropriate methodology to resolve external source issues and are in conformance with applicable CPSES criteria and commitments.

The responsibility for overview of Ebasco's corrective action was transferred from the Third Party to the TU Electric QA Technical Audit Program (CPRT Program Plan, Revision 4) before any substantive review work was concluded. Documentation of the limited Third Party corrective action overview that was completed has been transmitted [*Ref. 7.4.10*] to the TU Electric QA Technical Audit Program.

# 6.0 CONCLUSIONS

This report presents the results of the Third Party overview of the design adequacy of conduit/supports at the CPSES. The scope of the Third Party overview included evaluation of Ebasco's resolution of external source issues, as well as assessment of Ebasco's design validation procedures for compliance with the CPSES FSAR and licensing commitments.

The Third Party identified 29 external source issue groups that encompass the issues discussed in the external source documents listed in Attachment A. For each issue group, the Third Party has reviewed pertinent Ebasco design validation procedures, special studies, generic calculations, and test program results that address and resolve the concerns raised. The Third Party has also reviewed these documents for compliance with the CPSES FSAR and licensing commitments.

The Third Party has concluded that Ebasco's conduit/supports design validation program is comprehensive and capable of resolving known technical issues and assuring that the CPSES conduit/support design will comply with the CPSES FSAR and licensing commitments.

# 7.0 REFERENCES

## 7.1 TU ELECTRIC Documents

7.1.1 TU Electric CPSES FSAR.

7.1.2 "CPRT Program Plan," Rev. 4.

7.1.3 CPE-EB-FVM-CS-002, Field Verification Method, Design Control of Electrical Conduit Raceways, Unit 2, Rev. 4, dated July 6, 1987.

7.1.4 CPE-EB-FVM-CS-014, Field Verification Method, Design Control of Electrical Conduit Raceways for Unit 2 Installation in Unit 1 and Common Areas, Rev. 5, dated July 31, 1987.

7.1.5 CPE-EB-FVM-CS-033, Field Verification Method, Design Control of Electrical Conduit Raceways for Unit 1 Installation in Unit 1 and Common Areas, Rev. 2, dated June 19, 1987.

7.1.6 TUGCO Instruction CP-EI-4.0-4.9.

## 7.2 EBASCO Documents

### Design Criteria

7.2.1 Ebasco Specification No. SAG. CP2, Unit 2 Design Criteria for Seismic Category I Electrical Conduit System, Rev. 4, 5, 6, 7 and 9.

7.2.2 Ebasco Specification No. SAG. CP10, Unit 1 Design Criteria for Seismic Category I Electrical Conduit System, Rev. 0, 2,3 and 5.

7.2.3 Ebasco Specification No. SAG. CP12, Unit 2 Design Criteria for Junction Boxes for Seismic Category I Electrical Conduit Systems, Rev. 0, 2, and 4.

7.2.4 Ebasco Specification No. SAG. CP17, Unit 1 Design Criteria for Junction Boxes for Seismic Category I Electrical Conduit System, Rev. 1, 3, 5 and 7.

7.2.5 Engineering Guidelines for Conduit Support Design Adequacy, DBD-CS-22, Rev. 0.

### Design Procedures

7.2.6 Ebasco Specification No. SAG. CP14, Specification of Static and Cyclic Torque Test for Evaluation of Torsional Load Carrying Capability of Conduit Connections, Rev. 1.

7.2.7 Technical Guidelines for System Analysis of Conduit Span Configurations, SAG. CP20, Rev. 0 and 4.

7.2.8 Technical Guidelines for Thermal Analysis of Seismic Category I Electrical Conduit System, SAG. CP21, Rev. 3.

7.2.9 Technical Guidelines for Thermal Analysis of Seismic Category I Electrical Conduit Systems, SAG. CP22, Rev. 2.

7.2.10 Technical Guidelines for Seismic Category I Electrical Conduit Isometric Validation, Unit No. 1 and Common Areas, SAG.CP25, Rev. 1.

7.2.11 General Instructions for Design Verification of Electrical Conduit and Box Supports, Unit # 1, SAG. CP29, Rev. 0 and 4.

7.2.12 Procedure for Conduit Isometric Design Validation Package Close-out, SAG. CP35, Rev. 0.

7.2.13 Guidelines for Calculation Package Preparation, Review and Filing by Site Civil Engineering, Unit 2 Conduit Supports and Cable Tray Hangers, CP-SG-01, Rev. 2.

7.2.14 Technical Guidelines for Seismic Category I Electrical Conduit ISO Validation, Unit 2, CP-SG-02, Rev. 2.

7.2.15 Guidelines for Design Validation of Seismic Category I Electrical Conduit & Box Supports, CP-SG-03, Rev. 1.

7.2.16 Ebasco CPSES Unit 2 Conduit Calculation Book # 8, Finite Element Analysis Procedure, Rev. 0 and 3.

7.2.17 Procedures to determine reduced support capacity to meet minimum frequency and allowable stress requirements, SUPT-0231, Rev. PR.

7.2.18 Procedures for preparation of STRUDL Analysis Input, SPAN-1008, Rev. PR.

7.2.19 Position Paper on Quality of Construction of Conduits and Conduit Supports, Rev. 0, dated 10/16/87.

## Unit 1 – Special Studies

7.2.20 Ebasco CPSES Unit # 1 Calculation Book SPAN-1001, General Design Information References, Rev. PR and 1.

7.2.21 Ebasco CPSES Unit # 1 Calculation Book SPAN-1002, Seismic Spectrum Loading Database - 2% & 3% Damping, Rev. 0.

7.2.22 Ebasco CPSES Unit # 1 Calculation Book SPAN-1004, Group Seismic Spectra - 2% & 3% Damping, Rev. 0.

7.2.23 Ebasco CPSES Unit # 1 Calculation Book SPAN-1005, Group Seismic Spectrum Envelopes Database - 2% & 3% Damping, Rev. 0.

7.2.24 Ebasco CPSES Unit # 1 Calculation Book SPAN-1006, Evaluation of Conduit Clamps, Rev. 0.

7.2.25 Ebasco CPSES Unit # 1 Calculation Book SPAN-1007, Conduit Clamp Capacity, Rev. 0.

7.2.26 Ebasco CPSES Unit # 1 Calculation Book SPAN-1009, Final Design "G" Values, Rev. 0.

7.2.27 Ebasco CPSES Unit # 1 Calculation Book SPAN-1010, Support Frequency Requirements, Rev. 0.

7.2.28 Ebasco CPSES Unit #1 Calculation Book SPAN-1012, Procedure for Evaluation of Soft Systems, Rev. 0.

7.2.29 Ebasco CPSES Unit # 1 Calculation Book SPAN-1113, Load Distribution on Double Bend and Single Bend Study, Rev. PR.

7.2.30 Ebasco CPSES Unit #1 Calculation Book SPAN-1189, CYGNA Issue 17-Substitution of Next Heavier Structural Member Size, Rev. 1.

7.2.31 Ebasco CPSES Unit #1 Calculation Book SPAN-1192, Straight Run Conduit Support Reaction Study for Uneven Spans and Support Stiffness, Rev. 1.

7.2.32 Ebasco CPSES Unit #1 Calculation Book SPAN-1193, Straight Run Conduit Support Reaction Study for Uneven Spans with Minimum Support Frequency, Rev. 0.

7.2.33 Ebasco CPSES Unit #1 Calculation Book SPAN-1199, Conduit Span Design Validation Using Yield Stress $F_y$=25 Ksi, Rev. 0.

7.2.34 Ebasco CPSES Unit # 1 Calculation Book SPAN-1200, Generic Study on Revised Clamp Allowables, Rev. 0.

7.2.35 Ebasco CPSES Unit # 1 Calculation Book SUPT-0041, Design Aids, Rev. 0.

7.2.36 Ebasco CPSES Unit # 1 Calculation Book SUPT-0211, CSM Application Database by EZHANG, Rev. PR.

7.2.37 Ebasco CPSES Unit # 1 Calculation Book SUPT-0221, Comparison Between EZHANG & STRUDL Runs, Rev. PR.

7.2.38 Ebasco CPSES Unit # 1 Calculation Book SUPT-0233, Design "G" Values, Rev. PR.

7.2.39 Ebasco CPSES Unit # 1 Calculation Book SUPT-0235, Miscellaneous Studies, Rev. 0.

7.2.40 Ebasco CPSES Unit 1 Conduit Calculation Book SUPT-0246, Support Design Verification for CYGNA Issue No. 5, Rev. 1.

7.2.41 Ebasco CPSES Unit # 1 Calculation Book SUPT-0247, Substitution of Next Heavier Structural Member, Rev. 0.

7.2.42 Ebasco CPSES Unit #1 Calculation Book SUPT-0253, Effects of Oversize Bolt Holes, Rev. 1.

7.2.43 Ebasco CPSES Unit # 1 Calculation Book THER-1751, Vol. I, Junction Box 18" x 12" x 12" Type 1 (2 bolts), Rev. 0.

7.2.44 Ebasco CPSES Unit # 1 Calculation Book THER-1751, Vol. II, Junction Box 18" x 12" x 12" Type 1 (4 bolts) (JB2A), Rev. 0.

7.2.45 Ebasco CPSES Unit # 1 Calculation Book THER-1760, Use of Unit #2 Calc. Books 84, 85, and 91 for Unit #1, Rev. 0.

7.2.46 Ebasco CPSES Unit # 1 Calculation Book THER-1761, Study of Multiple Run Conduits on Single Support, Rev. 0.

7.2.47 Ebasco CPSES Unit # 1 Calculation Book THER-1901, Thermal Analysis, Rev. 0.

7.2.48 Ebasco CPSES Unit # 1 Calculation Book THER-1961, Conduit Support Stiffnesses, Rev. 0.

7.2.49 Ebasco CPSES Unit # 1 Calculation Book THER-1981, Hand Calculations - Add Thermal, Seismic, and Deal Loads and Compare with Capacity, Rev. 1.

7.2.50 Ebasco CPSES Unit # 1 Calculation Book CP-JB-20, Grouping of Electrical Seismic Category I Junction Box, Rev. 0.

7.2.51 Ebasco CPSES Unit # 1 Calculation Book CP-JB-21, Enveloping of Seismic Design Spectra for Junction Box, Rev. 0.

7.2.52 Ebasco Services, Inc., Effects of Bolt Hole Oversize in CTH and Conduit System Adequacy, Rev. 4.

## Unit 2 – Special Studies

7.2.53 Ebasco CPSES Unit # 2 Calculation Book # 2, Conduit System Frequencies and Design "G" Values, Rev. 0.

7.2.54 Ebasco CPSES Unit # 2 Calculation Book # 5, Allowable Stresses, Rev. 0.

7.2.55 Ebasco CPSES Unit # 2 Calculation Book # 6, Welding Requirements, Rev. 1.

7.2.56 Ebasco CPSES Unit # 2 Calculation Book # 7, Tube Section Properties, Rev. 0.

7.2.57 Ebasco CPSES Unit # 2 Calculation Book # 59, Floor Response Spectra for Containment, Internal Structures and Safeguard Buildings, Rev. 0.

7.2.58 Ebasco CPSES Unit # 2 Conduit Calculation Book # 60, Study on Conduit Support Anchorage, Rev. 1.

7.2.59 Ebasco CPSES Unit # 2 Calculation Book # 78, Torsional Capacity of Clamps, Rev. 0.

7.2.60 Ebasco CPSES Unit # 2 Thermal Study Calculation Book # 81, Straight Run Conduit Graphs, System Stiffness Versus Thermal Loads, Rev. 1.

7.2.61 Ebasco CPSES Unit # 2 Thermal Study Calculation Book # 82, Surface Mounted Conduits - Graphs of Clamp Stiffness Versus Thermal Loads, Rev. 1.

7.2.62 Ebasco CPSES Unit # 2 Thermal Study Calculation Book # 84, Comparison of Single and Double Bends versus Projected/Straight Runs, Rev. 0.

7.2.63 Ebasco CPSES Unit # 2 Thermal Calculation Book # 85, Comparison of Variation in Span Lengths and Support Stiffness for Straight Run Conduit, Rev. 1.

7.2.64 Ebasco CPSES Unit # 2 Thermal Calculation Book # 86, Study of Multiple Run Conduits on Single Supports, Rev. 0.

7.2.65 Ebasco CPSES Unit # 2 Thermal Study Calculation Book # 87, Volumes I & II, Straight Run Conduit Combining Seismic Load with Thermal & Dead Load (Group IV), Rev. 1.

7.2.66 Ebasco CPSES Unit # 2 Thermal Calculation Book # 91, Thermal Loads on One End Fixed Straight Run, Rev. 0.

7.2.67 Ebasco CPSES Unit # 2 Thermal Study Calculation Book # 92, Volume I, Rev. 0 and Volumes II, & III, Rev. 1, Accident Thermal Analysis.

7.2.68 Ebasco CPSES Unit # 2 Thermal Study Calculation Book # 94, Combining Loads for Surface Mounted Conduit, Rev. 0.

7.2.69 Ebasco CPSES Unit # 2 Thermal Study Calculation Book # 111, Volumes 1-11, Junction Boxes Thermal Analysis, Rev. 0.

7.2.70 Ebasco CPSES Unit # 2 Calculation Book # 129, Development of Skeleton for Frequency and Response Spectrum Analysis with STRUDL for ISO Evaluation, Rev. 0.

7.2.71 Ebasco CPSES Unit # 2 Calculation Book # 132, Embedded Conduit Cantilever Span (G-8a & LS-5a), Rev. 4.

7.2.72 Ebasco CPSES Unit # 2 Conduit Calculation Book # 145, Anchor Bolt Substitution (G-3a), Rev. 0.

7.2.73 Ebasco CPSES Unit # 2 Conduit Calculation Book # 151, Concrete Embedment Forces and Allowables, Rev. 0 & 1.

7.2.74 Ebasco CPSES Unit # 2 Conduit Calculation Book # 156, Effect of Oversize Hole on 2 Bolt Supports, Rev. 2.

7.2.75 Ebasco CPSES Unit # 2 Conduit Calculation Book # 158, Calculations to Respond to Third Party Concerns, Rev. 0.

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7.2.76 Ebasco CPSES Unit # 1 Calculation Book SPAN-1116, LS-Straight Aux., Rev. PR.

7.2.77 Ebasco CPSES Unit # 1 Calculation Book SPAN-1131, LS-DBL Bend Int., Rev. PR.

7.2.78 Ebasco CPSES Unit # 1 Calculation Book SPAN-1170, LS-Overhang w/DBL Bend AB, Rev. 0.

7.2.79 Ebasco CPSES Unit # 1 Calculation Book SUPT-1010, CSM-18a, Rev. 1.

7.2.80 Ebasco CPSES Unit # 1 Calculation Book SUPT-1020, CSM-23, Rev. 0.

7.2.81 Ebasco CPSES Unit # 1 Calculation Book SUPT-1024, CSM-27, Rev. 0.

7.2.82 Ebasco CPSES Unit # 1 Calculation Book SUPT-1050, CSM-43, Rev. PR.

7.2.83 Ebasco CPSES Unit # 1 Calculation Book SUPT-1226, JS-36, Rev. 0.

7.2.84 Ebasco CPSES Unit # 1 Calculation Book SUPT-1301, Support Type CA-3a & 3b, Rev. 0.

7.2.85 Ebasco CPSES Unit # 1 Calculation Book CP-JB-22-3BT, Electrical Junction Box Qualification Box No. 3BT, Rev. 0.

7.2.86 Ebasco CPSES Unit # 1 Calculation Book CP-JB-22-15, JB# 15, Rev. 0.

7.2.87 Ebasco CPSES Unit # 1 Calculation Book CP-JB-22-16AU, Electrical Junction Box Qualification Box No. 16AU, Rev. 0.

7.2.88 Ebasco CPSES Unit # 1 Calculation Book CP-JB-22-19E, Electrical Junction Box Qualification Box No. 19E, Rev. 1.

7.2.89 Ebasco CPSES Unit # 1 Calculation Book CP-JB-22-20, Grouping of Electrical Seismic Category I JB, Rev. 0.

7.2.90 Ebasco CPSES Unit # 1 Calculation Book CP-JB-22-27, Documentation of STRUDL Input Parameters, Rev. 1.

## Unit 2 – Generic Calculations

7.2.91 Ebasco CPSES Unit # 2 Calculation Book # 10, CSM-2b, Rev. 1.

7.2.92 Ebasco CPSES Unit # 2 Calculation Book # 11, CSM-7b, Rev. 0.

7.2.93 Ebasco CPSES Unit # 2 Calculation Book # 13, CSM-2a-IV, Rev. 0.

7.2.94 Ebasco CPSES Unit # 2 Calculation Book # 23, CSM-12a, Rev. 0.

7.2.95 Ebasco CPSES Unit # 2 Calculation Book # 27, JS-1a, Rev. 2.

7.2.96 Ebasco CPSES Unit # 2 Calculation Book # 30, CSM-11b, Rev. 3.

7.2.97 Ebasco CPSES Unit # 2 Calculation Book # 36, LS-10a, 10b, & 10c, Rev. 0.

7.2.98 Ebasco CPSES Unit # 2 Calculation Book #41 LS-6a, 6b, 6c, & 6d, Rev. 1.

7.2.99 Ebasco CPSES Unit # 2 Calculation Book# 44, CSD Series, Rev. 1.

7.2.100 Ebasco CPSES Unit # 2 Calculation Book # 48, JS-2b-II, Rev. 0.

7.2.101 Ebasco CPSES Unit # 2 Calculation Book # 55, JS-3C-II, Rev. 0.

7.2.102 Ebasco CPSES Unit # 2 Calculation Book # 57, CSM-2b-IV, Rev. 0.

7.2.103 Ebasco CPSES Unit # 2 Calculation Book # 61, LS-2a, Rev. 0.

7.2.104 Ebasco CPSES Unit # 2 Calculation Book # 69, LLS-6a & 6b, Rev. 1.

7.2.105 Ebasco CPSES Unit # 2 Calculation Book # 123-1, Direct Concrete Mounted Junction Box (36" x 30" x 36"), Rev. 2.

7.2.106 Ebasco CPSES Unit # 2 Calculation Book # 123-4, Structural Steel Support Mounted Junction Box (12" x 12" x 6"), Rev. 2.

7.2.107 Ebasco CPSES Unit # 2 Calculation Book # 127, K-Factors in LS-Series Dwgs., Rev. 1.

7.2.108 Ebasco CPSES Unit # 2 Calculation Book # 133, Vols. 1 - 23, Anchor Bolt Interaction Ratio, Rev. 0.

## Test Related Calculations

7.2.109 Calculation No. TNE-CS-CA-CA-1a, Capacities of Conduit Supports, Rev. 3.

7.2.110 Calculation No. TNE-CS-CA-CA-2b, Design of Conduit Supports, Rev. 1.

7.2.111 Calculation No. TNE-CS-CA-JA-1, Design of Conduit Supports, Rev. 0.

## Drawings

7.2.112 Drawing No. Package 2323-S-0910.

7.2.113 Drawing No. Package 2323-S2-0910.

## Letters

7.2.114 Ebasco Letter EB-T-3052, From J. P. Padalino To Dr. C.P. Mortgat, Dated May 28, 1987 with attached TRW Letter from Harry A. Chambers to H.S. Yu dated 5/2/87.

7.2.115 Ebasco Letter EB-T-1965, From R.C. Iotti to Doug Nyman, "TU Electric, CPSES, Acceptability of Fillet Welds Below Minimum AISC Size and of Skewed Fillet Welds," dated 3/3/87 with the following attachments:

1. Ebasco Letter From R.A. Keilbach to R.C. Iotti, dated 2/25/87.
2. Ebasco Welding Procedure Specification No. WP15, Revision 1, dated 1/12/84.
3. AWS Structural Welding Code Committee Interpretation No. D1-86-012.
4. Attachment 3.5, QAI-20-5, Liquid Penetrant Evaluation of Arc Strike Regions.

5. Van Malssen, S.H., "The Effects of Arc Strikes on Steels Used in Nuclear Construction", Welding Journal, July, 1984..

6. Welding Procedure Qualification Record CP-AWBB153, Dated 12/27/85.

7.2.116 Ebasco Letter EB-T-6102, from E. Odar to C. Mortgat, dated 10/16/87.

7.2.117 Ebasco Memo CND-54-12, from E. Odar to M. Strehlow/C.Y. Chiou, dated 8/17/87.

7.2.118 Ebasco Letter EB-T-6199, from E. Odar to C. Mortgat dated 10/29/87.

7.2.119 Ebasco Letter EB-T-6219, from E. Odar to C. Mortgat dated 10/30/87.

7.2.120 Ebasco Letter EB-T-6149, from E. Odar to C. Mortgat dated 10/21/87.

### Miscellaneous

7.2.121 Ebasco CPSES Cable Tray Hanger Special Study, Volume I, Book 3, Prying Action Factors and Formulas for Evaluating Anchor Bolts, Rev. 1.

## 7.3 Test Labs Documents

7.3.1 CCL Test Procedure # 1903.29-1, Rev. 1, Test Procedure for Static and Cyclic Tests of Conduit Couplings.

7.3.2 CCL Report No. A-678-85, Seismic Qualification Test Report of Conduit Support Systems, Volume I and II, dated 10/9/85.

7.3.3 CCL Report No. A-699-85, Conduit Clamp Test Report, Phase I dated 12/17/85.

7.3.4 CCL Report No. A-702-86, Conduit Clamp Test Report, Phase II dated 4/7/86.

7.3.5 CCL Letter 87000059.ESI from F.A. Thomas to J.P. Padatino (Ebasco), dated 9/29/87.

## 7.4 DAP Review Documents

### General

7.4.1 Comanche Peak Response Team, Design Adequacy Program, Quality Assurance Program and Procedures, Rev. 27: May 26, 1987.

7.4.2 DAP-CR-C/S-001, "C/S Design Criteria List," Rev. 2.

7.4.3 DAP-CLA-C/S-012, "Design Criteria Review Checklist for Cable Tray/Conduit Supports," Rev. 1.

7.4.4 DAP-E-C/S-119, "Thermal Loads," Rev. 1.

7.4.5 DAP-E-C/S-126, "Inaccessible Attributes, Fillet Weld Size," Rev. 0

7.4.6 DAP-E-C/S-148, "Design Verification Process - Ebasco," Rev. 0.

7.4.8 DAP-E-C/S-182, "Inaccessible Attributes - General (Ebasco)" Rev. 0.

7.4.9 DAP-E-C/S-183, "Oversize Bolt Holes in CTS Anchorage," Rev. 0.

7.4.10 Technical Audit Surveillance, Design Verification of Train A & B Conduit, DSAP VIII, Revision 0, dated May, 29, 1987.

7.4.11 DAP-RR-C/S-001, Discipline Specific Results Report: Civil/Structural-Cable Trays and Supports, Rev. 1.

## Engineering Evaluations for Ebasco Documents

7.4.12 DAP-E-C/S-301, "Unit #1 Train A & B As-Builting Procedures," Rev. 1.

7.4.13 DAP-E-C/S-302, "Unit #2 Train A & B As-Builting Procedures," Rev. 2.

7.4.14 DAP-E-C/S-303, "CP-SG-01, Rev. 2 - Guidelines for Calculation Package Preparation Review and Filing by Site Civil Engineering," Rev. 1.

7.4.15 DAP-E-C/S-304, "Unistrut Testing to Establish Unistrut Allowables for CPSES Unit # 1," Rev. 0.

7.4.16 DAP-E-C/S-305, "Thermal Effects on Conduit Systems," Rev. 1.

7.4.17 DAP-E-C/S-306, "Evaluation of Minimum Size Fillet Weld," Rev. 0.

7.4.18 DAP-E-C/S-307, "Units 1 & 2 Train A/B Conduit Support Capacity Validation," Rev. 1.

7.4.19 DAP-E-C/S-308, "Evaluations of Conduit Clamp Tests," Rev. 0.

7.4.20 DAP-E-C/S-309, "Documentation of Quality of Construction for Train A & B Conduit and Conduit Supports," Rev. 0.

7.4.21 DAP-E-C/S-310, "Evaluation of the Procedure for Train A & B Conduit Inaccessible Attributes," Rev. 0.

7.4.22 DAP-E-C/S-311, "Evaluation of CPSES Train A & B Conduit Electrical Junction Boxes Design Validation," Rev. 0.

7.4.23 DAP-E-C/S-312, "Evaluation of Procedure for Isometric Design Validation." Package Closeout," Rev. 1.

7.4.24 DAP-E-C/S-313, "Span Allowable Studies," Rev. 1.

7.4.25 DAP-E-C/S-314, "Train A & B Conduit Isometric Drawing Design Validation," Rev. 0. .

7.4.26 DAP-E-C/S-315, "Evaluation of Skewed Welds with Included Angles Less Than 45°," Rev. 0.

7.4.27 DAP-E-C/S-316, "Evaluation of Static and Cyclic Tests of Conduit Couplings," Rev. 0.

## DAP Checklists for Ebasco Documents

7.4.28 DAP-CLC-C/S-601 Train A & B Conduit Support Procedure Review Checklist, dated 8/6/87.

7.4.29 DAP-CLC-C/S-602 Train A & B Conduit Support Procedure Review Checklist, dated 8/6/87.

7.4.30 DAP-CLC-C/S-603 Train A & B Conduit Support Procedure Review Checklist, dated 8/6/87.

7.4.31 DAP-CLC-C/S-604 (Including Suppl. 1) Train A & B Conduit Support Procedure Review Checklist, dated 8/6/87.

7.4.32 DAP-CLC-C/S-605 (Including Suppl. 1) Train A & B Conduit Support Procedure Review Checklist, dated 8/6/87 and 8/19/87.

7.4.33 DAP-CLC-C/S-606 (Including Suppl. 1 & 2) Train A & B Conduit Support Procedure Review Checklist, dated 8/6/87 and 8/19/87.

7.4.34 DAP-CLC-C/S-607 (Including Suppl. 1, 2, & 3) Train A & B Conduit Support Procedure Review Checklist, dated 8/6/87 and 10/16/87

7.4.35 DAP-CLC-C/S-608 Train A & B Conduit Support Procedure Review Checklist, dated 8/6/87.

7.4.36 DAP-CLC-C/S-609 (Including Suppl. 1, 2, & 3) Train A & B Conduit Supports Procedure Review Checklist, dated 8/6/87 and 10/16/87

7.4.37 DAP-CLC-C/S-701 Train A & B Conduit Support Calculation Review Checklist, dated 8/7/87.

7.4.38 DAP-CLC-C/S-702 Train A & B Conduit Support Calculation Review Checklist, dated 8/7/87.

7.4.39 DAP-CLC-C/S-703 Train A & B Conduit Support Calculation Review Checklist, dated 8/7/87.

7.4.40 DAP-CLC-C/S-704 Train A & B Conduit Support Calculation Review Checklist, dated 8/7/87.

7.4.41 DAP-CLC-C/S-705 Train A & B Conduit Support Calculation Review Checklist, dated 8/7/87.

7.4.42 DAP-CLC-C/S-706 Train A & B Conduit Support Calculation Review Checklist, dated 8/7/87.

7.4.43 DAP-CLC-C/S-707 Train A & B Conduit Support Calculation Review Checklist, dated 8/7/87.

7.4.44 DAP-CLC-C/S-708 Train A & B Conduit Support Calculation Review Checklist, dated 8/7/87.

7.4.45 DAP-CLC-C/S-709 Train A & B Conduit Support Calculation Review Checklist, dated 8/7/87.

7.4.46 DAP-CLC-C/S-710 Train A & B Conduit Support Calculation Review Checklist, dated 8/7/87.

7.4.47 DAP-CLC-C/S-790 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.48 DAP-CLC-C/S-791 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.49 DAP-CLC-C/S-792 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.50 DAP-CLC-C/S-793 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.51 DAP-CLC-C/S-794 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.52 DAP-CLC-C/S-795 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.53 DAP-CLC-C/S-796 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.54 DAP-CLC-C/S-797 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.55 DAP-CLC-C/S-798 Train A & B Conduit Support Procedure Review Checklist, dated 8/19/87.

7.4.56 DAP-CLC-C/S-799 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.57 DAP-CLC-C/S-800 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.58 DAP-CLC-C/S-801 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.59 DAP-CLC-C/S-802 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.60 DAP-CLC-C/S-803 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.61 DAP-CLC-C/S-804 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.62 DAP-CLC-C/S-805 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.63 DAP-CLC-C/S-806 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.64 DAP-CLC-C/S-807 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.65 DAP-CLC-C/S-808 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.66 DAP-CLC-C/S-809 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.67 DAP-CLC-C/S-810 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.68 DAP-CLC-C/S-811 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.69 DAP-CLC-C/S-812 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.70 DAP-CLC-C/S-813 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.71 DAP-CLC-C/S-814 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.72 DAP-CLC-C/S-815 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.73 DAP-CLC-C/S-816 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.74 DAP-CLC-C/S-817 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.75 DAP-CLC-C/S-818 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.76 DAP-CLC-C/S-819 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.77 DAP-CLC-C/S-820 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.78 DAP-CLC-C/S-821 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.79 DAP-CLC-C/S-822 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.80 DAP-CLC-C/S-823 Train A & B Conduit Support Calculation Review Checklist dated 8/19/87.

7.4.81 DAP-CLC-C/S-824 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.82 DAP-CLC-C/S-825 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.83 DAP-CLC-C/S-826 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.84 DAP-CLC-C/S-827 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.85 DAP-CLC-C/S-828 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.86 DAP-CLC-C/S-829 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.87 DAP-CLC-C/S-830 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.88 DAP-CLC-C/S-831 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.89 DAP-CLC-C/S-832 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.90 DAP-CLC-C/S-833 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.91 DAP-CLC-C/S-834 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

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7.4.95 DAP-CLC-C/S-838 Train A & B Conduit Support Calculation Review Checklist, dated 8/27/87.

7.4.96 DAP-CLC-C/S-839 Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

7.4.97 DAP-CLC-C/S-840 (Including Suppl. 1) Train A & B Conduit Support Calculation Review Checklist, dated 8/19/87.

## 7.5 Other Documents


7.5.1 American Institute of Steel Construction (AISC), "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings," in Manual of Steel Construction, 7th Edition, 1969.

7.5.2 American Iron and Steel Institute (AISI), "Specification for the Design of Cold-Formed Steel Structural Members," 1968.

7.5.3 AISC Letter to Mr. L.D. Nace dated August 29, 1986.

7.5.4 Cygna Conduit Supports Review Issues List, Rev. 12, dated 11/20/85.

# ATTACHMENT A
# EXTERNAL SOURCE DOCUMENTS

ATTACHMENT A
EXTERNAL SOURCE DOCUMENTS

| Source Document | Date | Document Title |
|---|---|---|
| ASLB-1 | 09/01/83 | BOARD MEMORANDUM AND ORDER - MOTION TO REOPEN THE RECORD AND TO STRIKE |
| ASLB-2 | 12/28/83 | BOARD ORDER AND MEMORANDUM LBP-83-81: (QUALITY ASSURANCE FOR DESIGN) |
| ASLB-3 | 02/08/84 | MEMORANDUM AND BOARD ORDER LBP-84-10: (RECONSIDERATION CONCERNING QUALITY ASSURANCE FOR DESIGN) |
| ASLB-4 | 06/29/84 | ASLB MEMORANDUM AND ORDER LBP-84-25 (WRITTEN-FILING DECISIONS, #1: SOME AWS/ASME ISSUES) |
| ASLB-5 | 12/18/84 | BOARD MEMORANDUM CONCERNING WELDING ISSUES |
| ASLB-6 | 12/18/84 | BOARD MEMORANDUM - REOPENING DISCOVERY: MISLEADING STATEMENT |
| ASLB-7 | 07/29/82 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-8 | 07/30/82 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-9 | 09/13/82 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-10 | 09/13/82 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-11 | 09/14/82 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-12 | 09/15/82 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-13 | 09/16/82 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-14 | 04/25/83 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-15 | 05/16/83 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-16 | 05/17/83 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-17 | 05/17/83 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-18 | 05/18/83 | ASLB PROCEEDINGS TRANSCRIPT |
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| ASLB-22 | 06/14/83 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-23 | 06/15/83 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-24 | 06/16/83 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-25 | 10/17/83 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-26 | 10/18/83 | ASLB PROCEEDINGS TRANSCRIPT |

ATTACHMENT A — *Continued*

| Source Document | Date | Document Title |
|---|---|---|
| ASLB-27 | 02/20/84 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-28 | 02/21/84 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-29 | 02/23/84 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-30 | 03/19/84 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-31 | 03/20/84 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-32 | 03/21/84 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-33 | 03/22/84 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-34 | 03/23/84 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-35 | 03/30/84 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-36 | 04/18/84 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-37 | 04/24/84 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-38 | 04/25/84 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-39 | 04/26/84 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-40 | 04/27/84 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-41 | 05/01/84 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-42 | 05/02/84 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-43 | 05/03/84 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-44 | 02/22/84 | ASLB PROCEEDINGS TRANSCRIPT |
| ASLB-45 | 10/31/85 | ASLB MEMORANDUM AND ORDER LBP-85-14 (PROCEDURAL RULING BOARD CONCERN ABOUT QA FOR DESIGN). |
| ASLB-46 | 02/28/84 | TELEPHONE CONFERENCE - TO DISCUSS SCHEDULING MATTERS RELATED TO MARCH 12 THROUGH MARCH 16 HEARINGS |
| CASE-1 | 07/29/82 | CASE EXHIBIT 659 - WALSH TESTIMONY (EXH 659A-H) |
| CASE-2 | 08/19/82 | CASE EXHIBIT 669 - DOYLE ORAL DEPOSITION (VOLUME I), EXHIBIT 669A - (VOLUME II), AND EXHIBIT 669B - (DEPOSITION EXHIBITS) |
| CASE-3 | 09/13/82 | CASE EXHIBIT 683 - DOYLE SUPPLEMENTAL TESTIMONY |
| CASE-4 | 07/28/83 | OBJECTION TO BOARD'S FINDINGS AND CASE'S ANSWER TO APPLICANTS' 07/15/83 SUMMARY OF THE RECORD REGARDING WEAVE AND DOWNHILL WELDING |
| CASE-5 | 08/22/83 | CASE PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW |

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| Source Document | Date | Document Title |
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| CASE-6 | 09/03/83 | CASE'S MOTION REGARDING 09/07/83 CONFERENCE CALL |
| CASE-7 | 11/10/83 | CASE'S RESPONSE TO (1) APPLICANTS' BRIEF REGARDING BOARD INQUIRY INTO APPLICABILITY OF AWS AND CODES TO WELDING ON PIPE SUPPORTS AT CPSES: (2) NRC RESPONSE TO BOARD QUESTION ON CPSES WELDING CODE |
| CASE-8 | 11/23/83 | CASE'S MOTION FOR RECONSIDERATION (AFFIDAVITS ON OPEN ITEMS RELATING TO WALSH/DOYLE ALLEGATIONS) |
| CASE-9 | 08/06/84 | CASE'S ANSWER TO APPLICANTS MOTION FOR SUMMARY DISPOSITION REGARDING CONSIDERATION OF FRICTION FORCES IN THE DESIGN OF PIPE SUPPORTS WITH SMALL THERMAL MOVEMENTS |
| CASE-10 | 08/06/84 | CASE'S ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION OF CERTAIN CASE ALLEGATIONS REGARDING AWS AND ASME CODE PROVISIONS RELATED TO DESIGN ISSUES |
| CASE-11 | 08/06/84 | CASE'S ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING ALLEGED ERRORS MADE IN DETERMINING DAMPING FACTORS FOR OBE AND SSE LOADING CONDITIONS |
| CASE-12 | 08/13/84 | CASE'S ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING CASE ALLEGATIONS REGARDING SECTION PROPERTY VALUES |
| CASE-13 | 08/20/84 | CASE'S ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION OF CASE'S ALLEGATIONS REGARDING U-BOLTS ACTING AS TWO-WAY RESTRAINTS |
| CASE-14 | 08/27/84 | CASE'S PARTIAL ANSWER TO APPLICANTS' STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE REGARDING THE UPPER LATERAL RESTRAINT BEAM |
| CASE-15 | 08/27/84 | CASE'S PARTIAL ANSWER TO APPLICANTS' STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE REGARDING ALLEGATIONS CONCERNING CONSIDERATION OF FORCE DISTRIBUTION IN AXIAL RESTRAINTS |

ATTACHMENT A — *Continued*

| Source Document | Date | Document Title |
|---|---|---|
| CASE-16 | 08/27/84 | CASE'S PARTIAL ANSWER TO APPLICANTS' STATEMENT OF MATERIAL FACT AS TO WHICH THERE IS NO GENUINE ISSUE REGARDING APPLICANTS' USE OF GENERIC STIFFNESSES INSTEAD OF ACTUAL IN PIPING ANALYSIS |
| CASE-17 | 08/27/84 | CASE'S PARTIAL ANSWER TO APPLICANTS' STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE REGARDING DIFFERENTIAL DISPLACEMENT OF LARGE-FRAMED, WALL-TO-WALL AND FLOOR-TO-CEILING SUPPORTS |
| CASE-18 | 08/27/84 | CASE'S PARTIAL ANSWER TO APPLICANTS' STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE REGARDING SAFETY FACTORS |
| CASE-19 | 08/29/84 | CASE'S ANSWER TO APPLICANTS' STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE REGARDING CONSIDERATION OF LOCAL DISPLACEMENTS AND STRESSES |
| CASE-20 | 09/10/84 | CASE'S ANSWER TO APPLICANTS' STATEMENT OF MATERIAL FACTS RELATING TO RICHMOND INSERTS AS TO WHICH THERE ARE NO MATERIAL ISSUES |
| CASE-21 | 10/01/84 | CASE'S ANSWER TO APPLICANTS' REPLY TO CASE'S ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING CONSIDERATION OF FRICTION FORCES |
| CASE-22 | 10/08/84 | CASE'S ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING CONSIDERATION OF CINCHING DOWN OF U-BOLTS |
| CASE-23 | 10/09/84 | CASE'S ANSWER TO APPLICANTS' REPLY TO CASE'S ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING LOCAL DISPLACEMENTS AND STRESSES |
| CASE-24 | 10/13/84 | ATTACHMENTS TO CASE'S ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING CONSIDERATION OF CINCHING DOWN OF U-BOLTS |

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| Source Document | Date | Document Title |
|---|---|---|
| CASE-25 | 10/15/84 | DOCUMENTS AND INFORMATION REQUESTED BY CASE REGARDING APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING STABILITY OF PIPE SUPPORTS |
| CASE-26 | 10/18/84 | CASE'S PARTIAL ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING APPLICANTS' QUALITY ASSURANCE PROGRAM FOR DESIGN OF PIPING AND PIPE SUPPORTS FOR CPSES |
| CASE-27 | 10/18/84 | CASE'S DISCOVERY REQUESTS TO APPLICANTS REGARDING CROSS-OVER LEG RESTRAINTS |
| CASE-28 | 10/30/84 | CASE'S 2ND PARTIAL ANSWER TO APPLICANTS' STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE REGARDING APPLICANTS' QUALITY ASSURANCE PROGRAM FOR DESIGN OF PIPING AND PIPE SUPPORTS |
| CASE-29 | 11/20/84 | CASE'S ANSWER TO APPLICANTS' REPLY TO CASE'S ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING THE UPPER LATERAL RESTRAINT BEAM |
| CASE-30 | 12/19/84 | CASE'S 4TH ROUND ANSWER TO APPLICANTS' REPLY TO CASE'S ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING THE EFFECTS OF GAPS |
| CASE-31 | 01/17/85 | CASE'S FIRST SET OF INTERROGATORIES TO APPLICANTS AND REQUESTS TO PRODUCE |
| CASE-32 | 02/04/85 | CASE'S SECOND SET OF INTERROGATORIES TO APPLICANTS AND REQUESTS TO PRODUCE RE: CREDIBILITY |
| CASE-33 | 02/25/85 | CASE'S FOURTH SET OF INTERROGATORIES TO APPLICANTS AND REQUESTS TO PRODUCE |
| CASE-34 | 02/25/85 | CASE'S THIRD SET OF INTERROGATORIES TO APPLICANTS AND REQUESTS TO PRODUCE |
| CASE-35 | 03/04/85 | CASE'S FIFTH SET OF INTERROGATORIES TO APPLICANTS AND REQUESTS TO PRODUCE |
| CASE-36 | 04/26/83 | SURREBUTTAL TESTIMONY OF JACK DOYLE (CASE EXHIBIT 761 AND ATTACHMENTS) |
| CASE-37 | 04/28/83 | SUPPLEMENTARY SURREBUTTAL TESTIMONY OF JACK DOYLE (CASE EXHIBIT 762) |

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| CASE-38 | 05/04/83 | SUPPLEMENTARY SURREBUTTAL TESTIMONY OF JACK DOYLE (CASE EXHIBIT 763 AND ATTACHMENTS) |
| CASE-39 | 11/04/83 | CASE RESPONSE TO NRC AFFIDAVITS ON OPEN ITEMS RELATING TO WALSH/DOYLE ALLEGATIONS |
| CASE-40 | 11/28/83 | CASE'S ANSWER TO BOARD's 10/25/83 MEMORANDUM (PROCEDURE CONCERNING QUALITY ASSURANCE) |
| CASE-41 | 02/01/84 | CASE'S ANSWER TO MOTIONS FOR RECONSIDERATION OF BOARD'S MEMORANDUM AND ORDER (QUALITY ASSURANCE FOR DESIGN) BY APPLICANTS AND NRC STAFF |
| CASE-42 | 08/13/84 | CASE'S ANSWER TO APPLICANTS' STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE REGARDING THE EFFECTS OF GAPS ON STRUCTURAL BEHAVIOR UNDER SEISMIC LOADING CONDITIONS |
| CASE-43 | 05/04/83 | SURREBUTTAL TESTIMONY OF MARK ANTHONY WALSH |
| CASE-44 | 10/02/84 | CASE'S ANSWER TO APPLICANTS' REPLY TO CASES'S ANSWER TO APPLICANTS' MOTION REGARDING ALLEGED ERRORS MADE IN DETERMINING DAMPING FACTORS FOR OBE AND SSE LOADING CONDITIONS. |
| CASE-45 | 12/19/85 | CASE'S RESPONSE TO APPLICANTS' 11/12/85 CHANGES TO AFFIDAVITS IN SUPPORT OF APPLICANTS' MOTIONS FOR SUMMARY DISPOSITION. |
| IAP-1 | 10/12/84 | COMANCHE PEAK INDEPENDENT ASSESSMENT PROGRAM FINAL REPORT TR-83090-01, REV. 0 |
| IAP-2 | 11/20/84 | COMANCHE PEAK INDEPENDENT ASSESSMENT PROGRAM FINAL REPORT (PHASE 3) TR-84042-01 |
| IAP-3 | 03/14/85 | TUGCO/CPRT MEETING TO DISCUSS FINDINGS FROM INDEPENDENT ASSESSMENT PROGRAM |
| IAP-4 | 04/04/85 | REVIEW ISSUES LIST TRANSMITTAL - PIPE STRESS & PIPE SUPPORTS |
| IAP-5 | 04/04/85 | REVIEW ISSUES LIST TRANSMITTAL - CABLE TRAY SUPPORTS & CONDUIT SUPPORTS |
| IAP-6 | 04/04/85 | REVIEW ISSUES LIST TRANSMITTAL - ELECTRICAL/I&C |

ATTACHMENT A — *Continued*

| Source Document | Date | Document Title |
|---|---|---|
| IAP-7 | 04/04/85 | REVIEW ISSUES LIST TRANSMITTAL - MECHANICAL SYSTEMS |
| IAP-8 | 04/04/85 | REVIEW ISSUES LIST TRANSMITTAL - DESIGN CONTROL |
| IAP-9 | 04/23/85 | REVIEW ISSUES LIST TRANSMITTAL - PIPE STRESS (REV. 1) & PIPE SUPPORTS (REV. 1) |
| IAP-10 | 04/23/85 | REVIEW ISSUES LIST TRANSMITTAL - CABLE TRAY SUPPORTS (REV. 9) & CONDUIT SUPPORTS (REV. 1) |
| IAP-11 | 04/23/85 | REVIEW ISSUES LIST TRANSMITTAL - ELECTRICAL/I&C, REVISION 1 |
| IAP-12 | 04/23/85 | REVIEW ISSUES LIST TRANSMITTAL - MECHANICAL SYSTEMS, REVISION 1 |
| IAP-13 | 04/23/85 | REVIEW ISSUES LIST TRANSMITTAL - DESIGN CONTROL, REVISION 0 |
| IAP-14 | 06/21/85 | REVIEW ISSUES LIST TRANSMITTAL - CABLE TRAY SUPPORTS, REVISION 10 |
| IAP-15 | 06/21/85 | REVIEW ISSUES LIST TRANSMITTAL - DESIGN CONTROL, REVISION 1 |
| IAP-16 | 08/13/85 | REVIEW ISSUES LIST TRANSMITTAL - CABLE TRAY SUPPORTS (REV. 11) & CONDUIT SUPPORTS (REV. 2) |
| IAP-17 | 08/13/85 | REVIEW ISSUES LIST TRANSMITTAL - MECHANICAL SYSTEMS, REVISION 2 |
| IAP-18 | 08/13/85 | REVIEW ISSUES LIST TRANSMITTAL - ELECTRICAL/I&C, REVISION 2 |
| IAP-19 | 05/15/84 | IAP PHASE 4 - SUPPLEMENT TO APPLICANTS' PLAN TO RESPOND TO MEMORANDUM AND ORDER (QUALITY ASSURANCE FOR DESIGN), MARCH 13, 1984 |
| IAP-20 | 10/09/84 | CYGNA LTR. 84056.032 - REACTOR COOLANT THERMAL BARRIER RUPTURE |
| IAP-21 | 10/22/84 | CYGNA LTR. 84056.035 - REACTOR COOLANT PUMP THERMAL BARRIER RUPTURE - CLARIFICATION |
| IAP-22 | 01/18/85 | CYGNA LTR. 84042.022 - OPEN ITEMS ASSOCIATED WITH WALSH/DOYLE ALLEGATIONS |
| IAP-23 | 01/25/85 | CYGNA LTR. 84056.050 - STATUS OF IAP CONCLUSIONS, ALL PHASES |

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| Source Document | Date | Document Title |
|---|---|---|
| IAP-24 | 01/31/85 | CYGNA LTR. 84042.025 - PHASE 3 - WALSH/DOYLE ALLEGATIONS (RICHMOND INSERT ALLOWABLES AND BENDING STRESSES) |
| IAP-25 | 01/31/85 | CYGNA LTR. 84056.053 - PHASE 4 OPEN ITEMS (PUNCHING SHEAR) |
| IAP-26 | 02/08/85 | CYGNA LTR. 84042.021 - PHASE 3 OPEN ITEMS (MASS PARTICIPATION AND MASS POINT SPACING) |
| IAP-27 | 02/12/85 | CYGNA LTR. 84056.041 - CABLE TRAY SUPPORT REVIEW QUESTIONS |
| IAP-28 | 02/19/85 | CYGNA LTR. 84042.035 - STABILITY OF PIPE SUPPORTS |
| IAP-29 | 03/08/85 | CYGNA LTR. 83090.023 - RESPONSE TO NRC QUESTIONS, IAP PHASES 1 AND 2 |
| IAP-30 | 03/12/85 | CYGNA LTR. 84056.058 - PHASE 4 OPEN ITEMS (PUNCHING SHEAR) |
| IAP-31 | 03/25/85 | CYGNA LTR. 84042.036 - PHASE 3 OPEN ITEMS (CINCHING OF U-BOLTS) |
| IAP-32 | 03/29/85 | CYGNA LTR. 84056.060 - GENERIC ISSUES SUMMARY, IAP - ALL PHASES |
| IAP-33 | 11/20/85 | REVIEW ISSUES LIST TRANSMITTAL - CABLE TRAY SUPPORTS (REV. 12) |
| IAP-34 | 11/20/85 | REVIEW ISSUES LIST TRANSMITTAL - CONDUIT SUPPORTS (REV. 3) |
| MAC-1 | 05/17/78 | MANAGEMENT QUALITY ASSURANCE AUDIT |
| NRC-1 | 02/15/83 | NRC SPECIAL INSPECTION TEAM (SIT) REPORT (50-445/82-26)(50-446/82-14) AS A RESULT OF WALSH/DOYLE CONCERNS |
| NRC-2 | 04/11/83 | CONSTRUCTION APPRAISAL INSPECTION (CAT) 50-445/83-18, 50-446/83-12 |
| NRC-3 | 08/29/83 | NRC STAFF OBJECTIONS TO PROPOSED INITIAL DECISION |
| NRC-4 | 08/30/83 | NRC STAFF'S PROPOSED FINDINGS OF FACT IN THE FORM OF A PARTIAL INITIAL DECISION |
| NRC-5 | 10/03/83 | REGION IV CAT FOLLOW-UP REPORT |
| NRC-6 | 10/28/83 | NRC STAFF RESPONSE TO BOARD QUESTION REGARDING APPLICABLE WELDING CODES AT CPSES |

| Source Document | Date | Document Title |
|---|---|---|
| NRC-7 | 07/13/84 | COMANCHE PEAK SPECIAL REVIEW TEAM REPORT |
| NRC-8 | 11/02/84 | NRC STAFF RESPONSE TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION ON AWS AND ASME CODE PROVISIONS ON WELD DESIGN |
| NRC-9 | 09/30/85 | STAFF EVALUATION OF CPRT PROGRAM PLAN, REVISION 2, DETAILED COMMENTS/CONCERNS |
| NRC-10 | 07/01/81 | SAFETY EVALUATION REPORT - CPSES UNITS 1 & 2 (NUREG-0797) |
| NRC-11 | 10/01/81 | SAFETY EVALUATION REPORT - CPSES UNITS 1 & 2 (NUREG-0797) SUPPLEMENT NO. 1 |
| NRC-12 | 01/01/82 | SAFETY EVALUATION REPORT - CPSES UNITS 1 & 2 (NUREG-0797) SUPPLEMENT NO. 2 |
| NRC-13 | 03/01/83 | SAFETY EVALUATION REPORT - CPSES UNITS 1 & 2 (NUREG-0797) SUPPLEMENT NO. 3 |
| NRC-14 | 11/01/83 | SAFETY EVALUATION REPORT - CPSES UNITS 1 & 2 (NUREG-0797) SUPPLEMENT NO. 4 |
| NRC-15 | 11/01/84 | SAFETY EVALUATION REPORT - CPSES UNITS 1 & 2 (NUREG-0797) SUPPLEMENT NO. 6 |
| NRC-16 | 01/01/85 | SAFETY EVALUATION REPORT - CPSES UNITS 1 & 2 (NUREG-0797) SUPPLEMENT NO. 7 |
| NRC-17 | 02/01/85 | SAFETY EVALUATION REPORT - CPSES UNITS 1 & 2 (NUREG-0797) SUPPLEMENT NO. 8 |
| NRC-18 | 03/01/85 | SAFETY EVALUATION REPORT - CPSES UNITS 1 & 2 (NUREG-0797) SUPPLEMENT NO. 9 |
| NRC-19 | 04/01/85 | SAFETY EVALUATION REPORT - CPSES UNITS 1 & 2 (NUREG-0797) SUPPLEMENT NO. 10 |
| NRC-20 | 05/01/85 | SAFETY EVALUATION REPORT - CPSES UNITS 1 & 2 (NUREG-0797) SUPPLEMENT NO. 11 |
| NRC-21 | 09/02/82 | NRC STAFF TESTIMONY OF JOSEPH I. TAPIA AND W. PAUL CHEN IN REBUTTAL TO THE TESTIMONY OF MARK ANTHONY WALSH CONCERNING THE DESIGN OF PIPE SUPPORTS |
| NRC-22 | 05/13/83 | INSPECTION REPORT 50-445/83-12; 50-446/83-07 -- INSPECTION CONDUCTED BY J. I. TAPIA AND W. PAUL CHEN |
| NRC-23 | 12/13/83 | AFFIDAVITS OF JOSEPH I. TAPIA AND W. PAUL CHEN ON OPEN ITEMS RELATING TO WALSH/DOYLE CONCERNS |
| NRC-24 | / / | NRC INSPECTION REPORT 82-30 |

| Source Document | Date | Document Title |
|---|---|---|
| NRC-25 | 01/08/85 | NRC LETTER TO TUGCO RE: TRT QA/QC FINDINGS (ATTACHED TO NRCT-6). |
| NRC-26 | 05/30/85 | NRC REGION IV INSPECTION REPORTS 2/17/84 THROUGH 5/30/85. |
| NRC-27 | 10/11/84 | NRC INSPECTION REPORT (50-445/84-22)(50-446/84-07) - INSPECTIONS CONDUCTED UNDER RESIDENT INSPECTION PROGRAM 05/19/84 THROUGH 07/21/84 |
| NRC-28 | 02/27/79 | SUMMARY OF FEBRUARY 13, 1979 MEETING ON AUXILIARY SYSTEMS BRANCH QUESTIONS |
| NRC-29 | 11/17/80 | LETTER, R.L. TEDESCO TO R.J. GARY RE: SERVICE INSPECTION OF PRESSURE ISOLATION VALVES |
| NRC-30 | 01/14/81 | LETTER, R.L. TEDESCO TO R.J. GARY RE: PRESERVICE INSPECTION AND TESTING OF SNUBBERS |
| NRC-31 | 10/14/82 | TRIP REPORT-AUDIT OF TUSI DOCUMENTATION FOR ENVIRONMENTAL QUALIFICATION OF SAFETY-RELATED EQUIPMENT FOR CPSES 1 AND 2. |
| NRC-32 | 10/29/82 | SSER INPUT ON SEISMIC AND DYNAMIC QUALIFICATION OF SAFETY-RELATED ELECTRIC AND MECHANICAL EQUIPMENT |
| NRC-33 | 01/31/83 | REGION IV RESPONSE TO R.J. GARY LETTER ON SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE (SALP) |
| NRC-34 | 07/06/83 | SUBMITTAL OF INTERIM STAFF EVALUATION OF THE ALTERNATE SHUTDOWN DESIGN FOR THE CPSES |
| NRC-35 | 01/24/84 | SER UNRESOLVED ISSUES REQUIRING RESOLUTION PRIOR TO LICENSING CPSES UNIT 1 |
| NRC-36 | 01/24/84 | SER OUTSTANDING ISSUE (1), "PROTECTION AGAINST EFFECTS ASSOCIATED WITH THE POSTULATED RUPTURE OF PIPING OUTSIDE CONTAINMENT" |
| NRC-37 | 02/13/84 | ADDITIONAL INFORMATION ON ENVIRONMENTAL QUALIFICATION |
| NRC-38 | 05/17/84 | TRANSMITTAL OF PROPOSED SUPPLEMENT TO APPENDIX C OF THE SER FOR COMANCHE PEAK STEAM ELECTRIC STATION (UNITS 1 AND 2) |
| NRC-39 | 09/12/84 | NRC STAFF CONTROL ROOM DESIGN REVIEW REPORT FOR THE CPSES |

| Source Document | Date | Document Title |
|---|---|---|
| NRC-40 | 09/18/84 | COMANCHE PEAK REVIEW |
| NRC-41 | 11/13/84 | ACCEPTABILITY OF ASME CODE RELIEF REQUESTS PERTAINING TO THE PRESERVICE INSPECTION (PSI) PROGRAM FOR COMANCHE PEAK STEAM ELECTRIC STATION, UNIT 1 |
| NRC-42 | 11/19/84 | ISSUANCE OF SUPPLEMENT NO. 6 TO THE COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2 SAFETY EVALUATION REPORT |
| NRC-43 | 06/05/85 | USE OF ASME CODE CASES N-397 AND N-411 FOR THE CPSES (UNITS 1 AND 2) |
| NRC-44 | 06/07/85 | SUMMARY OF MEETING BETWEEN NRC STAFF AND TUGCO TO DISCUSS THE COMANCHE PEAK FIRE PROTECTION PROGRAM |
| NRC-45 | 06/10/85 | ISSUANCE OF SUPPLEMENT NO. 11 TO NUREG-0797 COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2 |
| NRC-46 | 07/24/85 | RESPONSE TO L.D. BUTTERFIELD'S MAY 16, 1985 REQUEST FOR COMMENTS ON THE WESTINGHOUSE OWNERS GROUP (WOG) GUIDELINES FOR PREPARING SUBMITTALS REQUESTING NRC APPROVAL OF REACTOR TRIP TECH. SPEC. CHANGES |
| NRC-47 | 09/25/85 | USE OF ASME CODE CASES N-397 AND N-411 FOR THE CPSES (UNITS 1 AND 2) |
| NRCT-1 | 09/18/84 | NRC-152 TECHNICAL REVIEW TEAM BRIEFING: COMANCHE PEAK REVIEW |
| NRCT-2 | 11/01/84 | SUMMARY OF MEETING TO DISCUSS THE APPLICANTS' PLAN FOR RESOLUTION OF REQUESTS FOR ADDITIONAL INFORMATION FROM THE COMANCHE PEAK TECHNICAL REVIEW TEAM EFFORT DESCRIBED IN LETTER DATED 09/18/84 |
| NRCT-3 | 12/20/84 | TRANSCRIPT CYGNA/NRC MEETING - INDEPENDENT ASSESSMENT PROGRAM |
| NRCT-4 | 01/10/85 | MEETING WITH CYGNA ON CPSES INDEPENDENT ASSESSMENT PROGRAM (PHASE 3) |
| NRCT-5 | 01/15/85 | MEETING WITH TUGCO CONCERNING THE MOTION FOR SUMMARY DISPOSITION ON QA/QC PROGRAM FOR DESIGN OF PIPING AND PIPE SUPPORTS FOR COMANCHE PEAK |

ATTACHMENT A — *Continued*

| Source Document | Date | Document Title |
|---|---|---|
| NRCT-6 | 01/17/85 | MEETING TO DISCUSS TECHNICAL REVIEW TEAM STAFF FINDINGS - COMANCHE PEAK |
| NRCT-7 | 02/07/85 | SUMMARY OF MEETING WITH CASE, TUGCO AND NRC CONTENTION 5 PANEL CONCERNING COMANCHE PEAK STEAM ELECTRIC STATION AND TECHNICAL ISSUES RAISED IN THE ASLB HEARINGS THURSDAY, FEBRUARY 7, 1985 |
| NRCT-8 | 02/26/85 | MEETING BETWEEN TEXAS UTILITIES AND THE NUCLEAR REGULATORY COMMISSION REGARDING COMANCHE PEAK STEAM ELECTRIC STATION - PIPING AND SUPPORT DESIGN |
| NRCT-9 | 02/27/85 | MEETING BETWEEN TEXAS UTILITIES AND THE NUCLEAR REGULATORY COMMISSION REGARDING COMANCHE PEAK STEAM ELECTRIC STATION - PIPING AND SUPPORT DESIGN |
| NRCT-10 | 03/06/85 | MEETING BETWEEN TEXAS UTILITIES AND THE NUCLEAR REGULATORY COMMISSION REGARDING CPSES - TRT TESTING PROGRAM ISSUES |
| NRCT-11 | 03/07/85 | MEETING BETWEEN TEXAS UTILITIES AND THE NUCLEAR REGULATORY COMMISSION REGARDING CPSES - MECHANICAL AND MISCELLANEOUS |
| NRCT-12 | 04/26/85 | CYGNA BRIEFING TO NRC MANAGEMENT ON COMANCHE PEAK STEAM ELECTRIC STATION INDEPENDENT ASSESSMENT PROGRAM |
| NRCT-13 | 06/06/84 | TELEPHONE CONFERENCE CALL (06/06/84) TO DISCUSS VARIOUS MOTIONS FOR SUMMARY DISPOSITION ON PIPE SUPPORT DESIGN AND QA ISSUES WHICH HAVE BEEN SUBMITTED BY THE APPLICANT |
| NRCT-14 | 06/08/84 | MEETING IN BETHESDA ON TECHNICAL DATA AND SUPPORTING MOTIONS FOR SUMMARY DISPOSITIONS |
| NRCT-15 | 06/11/84 | TELEPHONE CONFERENCE (NRC, CASE, TUGCO) TO DISCUSS MOTIONS FOR SUMMARY DISPOSITION ON PIPE SUPPORT DESIGN AND DESIGN QA |

ATTACHMENT A — *Continued*

| Source Document | Date | Document Title |
|---|---|---|
| NRCT-16 | 10/23/84 | MEETING TO DISCUSS THE APPLICANT'S PLAN FOR RESOLUTION OF REQUESTS FOR ADDITIONAL INFORMATION FROM THE COMANCHE PEAK TECHNICAL REVIEW TEAM (TRT) EFFORT |
| NRCT-17 | 03/23/85 | MEETING TO CONDUCT FEEDBACK DISCUSSION WITH MESSRS. WALSH AND DOYLE REGARDING CONCERNS ABOUT THE COMANCHE PEAK PLANT |
| NRCT-18 | 04/19/84 | MEETING WITH CYGNA ENERGY SERVICES ON INDEPENDENT ASSESSMENT PROGRAM (IAP) FOR COMANCHE PEAK |
| NRCT-19 | 07/03/84 | MEETING BETWEEN NRC STAFF AND CYGNA - 07/03/84 |
| NRCT-20 | 03/05/85 | MEETING BETWEEN TEXAS UTILITIES AND THE NUCLEAR REGULATORY COMMISSION REGARDING COMANCHE PEAK STEAM ELECTRIC STATION - QA/QC, APPLICANTS' PROGRAM PLAN |
| NRCT-21 | 06/20/84 | NRC MEETING TO DISCUSS SUBMITTED SUMMARY DISPOSITIONS |
| NRCT-22 | 10/19/84 | TUGCO MEETING WITH NRC STAFF |
| NRCT-23 | 11/13/84 | PREHEARING BRIEFING |
| NRCT-24 | 08/06/84 | DISCUSSION ON MOTIONS FOR SUMMARY DISPOSITION FILED BY APPLICANT, COMANCHE PEAK |
| NRCT-25 | 08/08/84 | QUESTIONS ON SUMMARY DISPOSITIONS FILED BY TEXAS UTILITIES ON COMANCHE PEAK |
| NRCT-26 | 08/09/84 | (HEARING TRANSCRIPT) IN THE MATTER OF COMANCHE PEAK, TEXAS UTILITY |
| NRCT-27 | 08/23/84 | COMANCHE PEAK MEETING BETWEEN NUCLEAR REGULATORY COMMISSION STAFF AND TEXAS UTILITIES - MOTIONS FOR SUMMARY DISPOSITION |
| NRCT-28 | 06/13/85 | NRC/TUGCO MEETING OF 06/13/85 AND 06/14/85 |
| NRCT-29 | 10/02/85 | PUBLIC HEARING RE: HOMOGENEOUS HARDWARE POPULATION FOR CONSTRUCTION ADEQUACY REVIEW AND SWEC REANALYSIS PROGRAM. |
| NRCT-30 | 06/13/85 | NRC/TUGCO MEETING - VOLUME I - MORNING SESSION |

ATTACHMENT A — *Continued*

| Source Document | Date | Document Title |
|---|---|---|
| NRCT-31 | 06/13/85 | NRC/TUGCO MEETING - VOLUME II - AFTERNOON SESSION |
| NRCT-32 | 06/14/85 | NRC/TUGCO MEETING - VOLUME I - MORNING SESSION |
| NRCT-33 | 06/14/85 | NRC/TUGCO MEETING - VOLUME II - AFTERNOON SESSION |
| NRCT-34 | 06/18/85 | MEETING ON RECALCULATION OF SEISMIC RESPONSE SPECTRA: COMANCHE PEAK |
| NRCT-35 | 08/14/85 | SUMMARY OF MEETING BETWEEN THE NRC COMANCHE PEAK INTIMIDATION PANEL, THE APPLICANT, AND THE INTERVENER TO BRIEF THE COMANCHE PEAK PANEL ON THE ALLEGED INTIMIDATION ISSUES AT COMANCHE PEAK |
| NRCT-36 | 09/17/85 | MEETING BETWEEN NRC STAFF AND TEXAS UTILITIES GENERATING COMPANY TO DISCUSS THE OFFICIAL INSPECTION OF PAINTED SUPPORT WELDS |
| NRCT-37 | 10/18/85 | SUMMARY OF 10/2-3/85 MEETING - BASIS FOR ESTABLISHING THE HOMOGENEOUS HARDWARE POPULATIONS FOR THE CONSTRUCTION ADEQUACY REVIEW, AND THE STONE AND WEBSTER PIPE AND PIPE SUPPORT REANALYSIS PROGRAM |
| NRCT-38 | 11/05/85 | TUGCO MEETING WITH NRC - CPRT MONTHLY STATUS - NOVEMBER 5-6, 1985 - VOLUME I |
| NRCT-39 | 11/06/85 | TUGCO MEETING WITH NRC - CPRT MONTHLY STATUS - NOVEMBER 5-6, 1985 - VOLUME II |
| NRCT-40 | 11/05/85 | HANDOUTS FROM PUBLIC MEETING IN GRANBURY NOVEMBER 5-6, 1985 |
| NRCT-41 | 11/12/85 | TRANSCRIPT OF PUBLIC HEARING HELD IN DALLAS, TEXAS |
| NRCT-42 | 12/18/85 | TUGCO MEETING WITH NRC - CPRT MONTHLY STATUS |
| NRCT-43 | 02/06/86 | TUGCO-NRC PUBLIC MEETING, ARLINGTON, TEXAS |
| TUGC-1 | 08/05/83 | APPLICANTS' PROPOSED FINDINGS OF FACT IN THE FORM OF A PARTIAL INITIAL DECISION |
| TUGC-2 | 08/29/83 | TRANSMITTAL OF "DIRECTOR'S DECISION UNDER 10CFR2.206" DENYING PETITION FILED BY MRS. ELLIS ON BEHALF OF CASE |

| Source Document | Date | Document Title |
|---|---|---|
| TUGC-3 | 08/30/83 | APPLICANTS' MOTION TO ESTABLISH SCHEDULE FOR SPECIAL PROCEEDING, FURTHER PROCEEDINGS (IF NECESSARY), AND FOR CLOSING RECORD AND FOR EXPEDITED REPLY |
| TUGC-4 | 08/31/83 | APPLICANTS' (1) ANSWER TO CASE'S MOTION TO SUPPLEMENT THE RECORD (REGARDING WALSH/DOYLE ALLEGATIONS) (2) REQUEST FOR EXPEDITED RULING AND (3) MOTION FOR NOTICE OF INTENT TO IMPOSE SANCTIONS |
| TUGC-5 | 09/06/83 | APPLICANTS' REPLY TO CASE'S PROPOSED FINDINGS OF FACT AND CONCLUSIONS OF LAW (WALSH/DOYLE ALLEGATIONS) |
| TUGC-6 | 10/28/83 | APPLICANTS' BRIEF REGARDING BOARD INQUIRY INTO APPLICABILITY OF AWS AND ASME CODES TO WELDING ON PIPE SUPPORTS AT COMANCHE PEAK |
| TUGC-7 | 05/16/84 | APPLICANTS' MOTION FOR SUMMARY DEPOSIT REGARDING ALLEGED ERRORS MADE IN DETERMINING DAMPING FACTORS FOR OBE AND SSE LOADING CONDITIONS |
| TUGC-8 | 05/17/84 | APPLICANTS' MOTION FOR SUMMARY DISPOSITION OF CERTAIN CASE ALLEGATIONS REGARDING AWS AND ASME CODE PROVISIONS RELATED TO DESIGN ISSUES |
| TUGC-9 | 05/18/84 | APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING THE EFFECTS OF GAPS ON STRUCTURAL BEHAVIOR UNDER SEISMIC LOADING CONDITIONS |
| TUGC-10 | 05/18/84 | APPLICANTS' MOTION FOR SUMMARY DISPOSITION OF CASE ALLEGATION REGARDING SECTION PROPERTY VALUES |
| TUGC-11 | 05/20/84 | APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING UPPER LATERAL RESTRAINT BEAM |
| TUGC-12 | 05/20/84 | APPLICANTS' MOTION FOR SUMMARY DISPOSITION OF CASE'S ALLEGATIONS REGARDING SAFETY FACTORS |
| TUGC-13 | 05/21/84 | APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING USE OF GENERIC STIFFNESSES INSTEAD OF ACTUAL STIFFNESSES IN PIPING ANALYSIS |

ATTACHMENT A — *Continued*

| Source Document | Date | Document Title |
|---|---|---|
| TUGC-14 | 05/23/84 | APPLICANTS' MOTION FOR SUMMARY DISPOSITION OF CASE'S ALLEGATIONS REGARDING U-BOLTS ACTING AS TWO-WAY RESTRAINTS |
| TUGC-15 | 06/02/84 | APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING DESIGN OF RICHMOND INSERTS AND THEIR APPLICATION TO SUPPORT DESIGN |
| TUGC-16 | 06/17/84 | APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING STABILITY OF PIPE SUPPORTS |
| TUGC-17 | 06/18/84 | APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING CONSIDERATION OF LOCAL DISPLACEMENTS AND STRESSES |
| TUGC-18 | 06/22/84 | APPLICANTS' MOTION FOR SUMMARY DISPOSITION OF CASE ALLEGATIONS REGARDING DIFFERENTIAL DISPLACEMENT OF LARGE-FRAMED, WALL-TO-WALL, AND FLOOR-TO-CEILING PIPE SUPPORTS |
| TUGC-19 | 06/29/84 | APPLICANTS' MOTION FOR SUMMARY DISPOSITION OF CASE'S ALLEGATIONS REGARDING CINCHING DOWN OF U-BOLTS |
| TUGC-20 | 07/03/84 | APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING ALLEGATIONS CONCERNING QUALITY ASSURANCE PROGRAM FOR DESIGN OF PIPING AND PIPE SUPPORTS FOR COMANCHE PEAK STEAM ELECTRIC STATION |
| TUGC-21 | 07/09/84 | APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING ALLEGATIONS CONCERNING CONSIDERATION OF FORCE DISTRIBUTION IN AXIAL RESTRAINTS |
| TUGC-22 | 08/31/84 | CORRECTIONS TO THE RICHMOND INSERT MOTION FOR SUMMARY DISPOSITION |
| TUGC-23 | 09/19/84 | APPLICANTS' REPLY TO CASE'S ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING CONSIDERATION OF FRICTION FORCES |
| TUGC-24 | 09/21/84 | APPLICANTS' REPLY TO CASE'S ANSWER TO APPLICANTS' MOTION REGARDING ALLEGED ERRORS MADE IN DETERMINING DAMPING FACTORS FOR OBE AND SSE LOADING CONDITIONS |

| Source Document | Date | Document Title |
|---|---|---|
| TUGC-25 | 09/28/84 | APPLICANTS' REPLY TO CASE'S ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING LOCAL DISPLACEMENTS AND STRESSES |
| TUGC-26 | 10/01/84 | APPLICANTS' REPLY TO CASE'S ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING DIFFERENTIAL DISPLACEMENTS OF LARGE-FRAMED, WALL-TO-WALL, AND FLOOR-TO-CEILING PIPE SUPPORTS |
| TUGC-27 | 10/26/84 | APPLICANTS' REPLY TO CASE'S ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING THE UPPER LATERAL RESTRAINT BEAM |
| TUGC-28 | 10/26/84 | APPLICANTS' REPLY TO (1) CASE'S ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING THE EFFECTS OF GAPS AND (2) BOARD CHAIRMAN'S "PRELIMINARY VIEWS" REGARDING ADDITIONAL PLEADINGS |
| TUGC-29 | 11/02/84 | APPLICANTS' REPLY TO CASE'S PARTIAL ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING SAFETY FACTORS |
| TUGC-30 | 11/12/84 | APPLICANTS' REPLY TO CASE'S ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING SECTION PROPERTIES |
| TUGC-31 | 06/06/83 | APPLICANT'S RESPONSE TO BOARD INQUIRY REGARDING ITERATIVE DESIGN PROCESS FOR PIPING |
| TUGC-32 | 09/14/82 | TESTIMONY OF KENNETH L. SCHEPPELE, ROGER F. REEDY, PETER S. Y. CHANG, JOHN C. FINNERAN, AND GARY KRISHNAN REGARDING WALSH ALLEGATIONS |
| TUGC-33 | 09/14/82 | SUPPLEMENTAL TESTIMONY OF KENNETH L. SCHEPPELE, ROGER F. REEDY, PETER S. Y. CHANG, JOHN C. FINNERAN, AND GARY KRISHNAN REGARDING DOYLE ALLEGATIONS |
| TUGC-34 | 09/13/84 | DISCUSSION BETWEEN CYGNA ENERGY SERVICES AND TEXAS UTILITIES GENERATING COMPANY AND EBASCO SERVICES, INC. |
| TUGC-35 | 05/21/85 | TEXAS UTILITIES CPRT MEETING - CYGNA ENERGY SERVICES 05/21/85 AND 05/22/85 |

| Source Document | Date | Document Title |
|---|---|---|
| TUGC-36 | 10/01/82 | COMANCHE PEAK STEAM ELECTRIC STATION, DESIGN AND CONSTRUCTION, SELF-INITIATED EVALUATION |
| TUGC-37 | 08/01/78 | LETTER, H.R. ROCK TO H.C. SCHMIDT RE: PRESSURIZER DISCHARGE PIPING CLASSIFICATION |
| TUGC-38 | 08/17/78 | LETTER, H.R. ROCK TO H.C. SCHMIDT RE: LICENSING QUESTION |
| TUGC-39 | 08/24/78 | LETTER, H.R. ROCK TO H.C. SCHMIDT RE: CONFIRMATION OF INSTRUCTIONS - CLASSIFICATION OF PRESSURIZER SAFETY RELIEF VALVE DISCHARGE PIPING |
| TUGC-40 | 03/19/79 | LETTER, R.J. GARY TO W.C. SEIDLE RE: UNIT NO. 1 REACTOR VESSEL NOZZLE WELD METAL DEFECTS |
| TUGC-41 | 08/10/79 | LETTER, R.J. GARY TO W.C. SEIDLE RE: PIPE SUPPORTS |
| TUGC-42 | 09/11/79 | LETTER, R.J. GARY TO W.C. SEIDLE RE: PIPE WALL THICKNESS |
| TUGC-43 | 01/23/80 | LETTER, R.J. GARY TO W.C. SEIDLE RE: PIPING MINIMUM WALL |
| TUGC-44 | 03/28/80 | LETTER, R.J. GARY TO W.C. SEIDLE RE: PIPING MINIMUM WALL |
| TUGC-45 | 04/21/80 | LETTER, R.J. GARY TO W.C. SEIDLE RE: CLASS V PIPING SUPPORTS |
| TUGC-46 | 04/15/80 | LETTER, R.J. GARY TO W.C. SEIDLE RE: PIPING MINIMUM WALL |
| TUGC-47 | 06/19/80 | LETTER, R.J. GARY TO W.C. SEIDLE RE: PIPING MINIMUM WALL |
| TUGC-48 | 07/14/80 | LETTER, R.J. GARY TO W.C. SEIDLE RE: CLASS V PIPING SUPPORTS |
| TUGC-49 | 09/18/80 | LETTER, R.J. GARY TO W.C. SEIDLE RE: CLASS V PIPING SUPPORTS |
| TUGC-50 | 10/21/80 | LETTER, R.J. GARY TO W.C. SEIDLE RE: DIESEL GENERATOR PIPE SUPPORTS |
| TUGC-51 | 12/16/80 | LETTER, R.J. GARY TO W.C. SEIDLE RE: PIPING MINIMUM WALL |
| TUGC-52 | 01/12/81 | LETTER, R.J. GARY TO W.C. SEIDLE RE: DIESEL GENERATOR PIPE SUPPORTS |

| Source Document | Date | Document Title |
|---|---|---|
| TUGC-53 | 04/13/81 | LETTER, J.S. MARSHALL TO R.L. TEDESCO RE: PRESERVICE INSPECTION AND TESTING OF SNUBBERS |
| TUGC-54 | 07/29/81 | LETTER, R.J. GARY TO G.L. MADSEN RE: DIESEL GENERATOR PIPE SUPPORTS |
| TUGC-55 | 06/03/81 | LETTER, R.J. GARY TO G.L. MADSEN RE: PIPING MINIMUM WALL |
| TUGC-56 | 10/02/81 | LETTER, R.J. GARY TO G.L. MADSEN RE: DIESEL GENERATOR PIPE SUPPORTS |
| TUGC-57 | 03/31/82 | LETTER, H.C. SCHMIDT TO S.B. BURWELL RE: FUNCTIONAL CAPABILITY OF CLASS 2 AND 3 BENDS AND ELBOWS |
| TUGC-58 | 08/16/82 | LETTER, R.J. GARY TO H.R. DENTON RE: DESIGN CERTIFICATION |
| TUGC-59 | 05/13/82 | LETTER, H.C. SCHMIDT TO S. BURWELL RE: STEAM GENERATOR LEVEL CONTROL |
| TUGC-60 | 03/08/83 | LETTER, H.C. SCHMIDT TO B.J. YOUNGBLOOD RE: ACCIDENT MONITORING - STEAM GENERATOR SAFETY VALVE POSITION INDICATION |
| TUGC-61 | 03/29/83 | LETTER, R.J. GARY TO G.L. MADSEN RE: VENDOR INSTALLED HVAC SYSTEM (SDAR-106 CP-83-06) |
| TUGC-62 | 06/21/83 | LETTER, R.J. GARY TO G.L. MADSEN RE: COMPONENT COOLING WATER CLASS V PIPING (QA FILE: CP-83-11, SDAR-111) |
| TUGC-63 | 07/22/83 | ALTERNATE SHUTDOWN - INTERIM STAFF EVALUATION |
| TUGC-64 | 08/31/83 | RESPONSE TO NRC NOTICE OF VIOLATION - INSPECTION REPORT NO. 83-23, FINDING NO. 1 |
| TUGC-65 | 10/06/83 | SER TABLES ON EQUIPMENT QUALIFICATION |
| TUGC-66 | 01/05/84 | LETTER, H.C. SCHMIDT TO B.J. YOUNGBLOOD RE: HIGH/MODERATE ENERGY PIPE BREAK ANALYSIS |
| TUGC-67 | 02/17/84 | LETTER, R.J. GARY TO B.J. YOUNGBLOOD RE: REQUEST FOR PARTIAL EXEMPTION |
| TUGC-68 | 03/08/84 | HUMAN FACTORS CONTROL ROOM DESIGN REVIEW - FINAL REPORT |
| TUGC-69 | 04/06/84 | TUGCO COMMENTS ON CYGNA'S INDEPENDENT ASSESSMENT PROGRAM |

ATTACHMENT A — *Continued*

| Source Document | Date | Document Title |
|---|---|---|
| TUGC-70 | 06/29/84 | LETTER, H.C. SCHMIDT TO B.J. YOUNGBLOOD RE: EQUIPMENT ENVIRONMENTAL QUALIFICATION - JUSTIFICATIONS FOR INTERIM OPERATION |
| TUGC-71 | 09/28/84 | LETTER, J.W. BECK TO B.J. YOUNGBLOOD RE: IMPACT OF TEMPERATURE DUE TO MAIN STEAM LINE BREAK OUTSIDE CONTAINMENT ON EQUIPMENT THAT REQUIRES ENVIRONMENTAL QUALIFICATION |
| TUGC-72 | 01/17/85 | LETTER, J.W. BECK TO B.J. YOUNGBLOOD RE: ENGINEERING AND CONSTRUCTION STATUS REPORT |
| TUGC-73 | 02/14/85 | LETTER, J.W. BECK TO B.J. YOUNGBLOOD RE: MAIN STEAM LINE BREAKS OUTSIDE CONTAINMENT |
| TUGC-74 | 04/09/85 | LETTER, J.W. BECK TO B.J. YOUNGBLOOD RE: FINAL DRAFT TECHNICAL SPECIFICATIONS |
| TUGC-75 | 04/23/85 | LETTER, J.W.BECK TO B.J. YOUNGBLOOD RE: TEMPORARY CHANGES TO PROCEDURES |
| TUGC-76 | 05/02/85 | LETTER, J.W. BECK TO V.S. NOONAN RE: ARBITRARY INTERMEDIATE PIPE BREAKS |
| TUGC-77 | 06/07/85 | LETTER, J.W. BECK TO V.S. NOONAN RE: NRC GENERIC LETTER 83-28 |
| TUGC-78 | 07/10/85 | LETTER, W.G. COUNSEL TO V.S. NOONAN RE: RESOLUTION OF TMI ACTION ITEMS II.K.3.30 AND II.K.3.31 RELATED TO SMALL BREAK LOCA ANALYSIS |
| TUGC-79 | 07/15/85 | LETTER, W.G. COUNSEL TO V.S. NOONAN RE: CLARIFICATION TO TEXAS UTILITIES LETTER TXX-4426 |
| TUGC-80 | 10/14/85 | LETTER, W.G. COUNSEL TO V.S. NOONAN RE: RESPONSE TO GENERIC LETTER 85-06 (ANTICIPATED TRANSIENTS WITHOUT SCRAM) |
| TUGC-81 | 12/20/85 | LETTER, J.W. BECK TO E.H. JOHNSON RE: DAMAGE STUDY EVALUATION OF WESTINGHOUSE SDAR: CP-85-46 |
| TUGC-82 | 02/28/86 | LETTER, W.G. COUNSEL TO V.S. NOONAN RE: USE OF ASME CODE EDITION AND ADDENDA |
| TUGC-83 | 12/15/86 | TRANSCRIPT OF CYNGA/SWEC MEETING IN GLEN ROSE, TEXAS |

ATTACHMENT A — *Continued*

| Source Document | Date | Document Title |
|---|---|---|
| TUGC-84 | 04/05/84 | APPLICANTS' MOTION FOR SUMMARY DISPOSITION OF CERTAIN CASE ALLEGATIONS REGARDING AWS AND ASME CODE PROVISIONS RELATED TO WELDING ISSUES REQUEST FOR EXPEDITED RESPONSE |
| XASL-001 | 08/19/83 | MEMORANDUM AND ORDER - MOTION FOR CLARIFICATION ON THERMAL STRESS IN PIPE SUPPORTS |
| XASL-002 | 07/06/83 | MEMORANDUM AND ORDER - THERMAL STRESS IN PIPE SUPPORTS |
| XASL-003 | 10/18/84 | MEMORANDUM AND ORDER - MORE DETAIL ON INDIVIDUAL PIPE SUPPORTS |
| XASL-004 | 11/10/83 | AFFIDAVIT OF JACK DOYLE |
| XASL-005 | 10/06/83 | PARTIAL INITIAL DECISION (CHANGE IN MATERIAL PROPERTIES FOR A500 STEEL) |
| XCAS-001 | 08/16/83 | CASE'S ANSWER TO APPLICANTS' MOTION FOR CLARIFICATION OF MEMORANDUM AND ORDER ON THERMAL STRESS AND PIPE SUPPORTS |
| XCAS-002 | 07/15/83 | MOTION FOR RECONSIDERATION OF BOARD'S 07/06/87 MEMORANDUM AND ORDER - THERMAL STRESS IN PIPE SUPPORTS |
| XCAS-003 | 05/09/83 | CASE'S RESPONSE TO BOARD's REQUEST FOR DISCUSSION OF INTERRELATIONSHIP OF ASME APPENDIX XVII, 2271.3, TO REST OF ASME CODE |
| XCAS-004 | 10/06/84 | CASE'S STATEMENT OF MATERIAL FACT AS TO WHICH THERE IS NO GENUINE ISSUE REGARDING CASE'S FIRST MOTION FOR SUMMARY DISPOSITION REGARDING CERTAIN ASPECTS OF THE IMPLEMENTATION OF APPLICANTS' DESIGN |
| XCAS-005 | 09/26/84 | CASE'S ANSWER TO APPLICANTS' RESPONSE TO BOARD'S PARTIAL INITIAL DECISION REGARDING A500 STEEL |
| XCAS-006 | 05/14/84 | CASE'S ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION OF CERTAIN CASE ALLEGATIONS REGARDING AWS AND ASME CODE PROVISIONS RELATED TO WELDING ISSUES |
| XCAS-007 | 01/17/85 | CASE'S 01/17/85 SUPPLEMENT TO CASE'S ANSWER TO APPLICANTS' MOTION FOR SUMMARY DISPOSITION REGARDING LOCAL DISPLACEMENTS AND STRESSES |

ATTACHMENT A — *Continued*

| Source Document | Date | Document Title |
|---|---|---|
| XCAS-008 | 11/05/84 | CASES ANSWER TO APPLICANTS' RESPONSE TO BOARD REQUEST FOR INFORMATION REGARDING CINCHING DOWN U-BOLTS |
| XNRC-001 | 05/11/83 | NRC STAFF RESPONSE TO BOARD INQUIRY REGARDING APPENDIX XVII OF THE ASME BOILER AND PRESSURE VESSEL CODE |
| XNRC-002 | 05/03/83 | NRC STAFF REPLY TO CASE'S BRIEF REGARDING CONSIDERATION OF LOCA IN DESIGN CRITERIA FOR PIPE SUPPORTS |
| XNRC-003 | 04/29/83 | NRC STAFF MOTION FOR PROTECTIVE ORDER |
| XNRC-004 | 04/20/83 | NRC STAFF ANSWER TO CASE MOTIONS SEEKING ADMISSION OF DOCUMENTS |
| XNRC-005 | 06/02/82 | NRC STAFF'S ANSWER SUPPORTING APPLICANTS' MOTION FOR SUMMARY DISPOSITION OF CONTENTION 5 |
| XNRC-006 | 03/15/82 | NRC STAFF'S ANSWER TO CFUR'S MOTION FOR VOLUNTARY DISMISSAL |
| XNRC-007 | 09/28/84 | NRC STAFF RESPONSE TO APPLICANTS' AND CASE'S FINDINGS OF FACT ON WELD FABRICATION |
| XNRC-008 | 02/02/84 | NRC STAFF'S RESPONSE TO CASE'S (1) DECEMBER 23, 1983 RESPONSE TO APPLICANTS' IDENTIFICATION OF ISSUES, AND (2) JANUARY 16, 1984 CLARIFICATION OF ISSUES IN 12/23/83 PLEADING |
| XNRC-009 | 02/06/84 | NRC STAFF RESPONSE TO CASE'S MOTION FOR RECONSIDERATION OF BOARD'S 12/28/83 MEMORANDUM AND ORDER (QUALITY ASSURANCE FOR DESIGN) |
| XNRC-010 | 01/27/84 | NRC STAFF RESPONSE TO APPLICANTS' MOTION FOR RECONSIDERATION OF MEMORANDUM AND ORDER (QUALITY ASSURANCE FOR DESIGN) |
| XNRC-011 | 12/13/83 | NRC STAFF MOTION TO REOPEN RECORD TO ADMIT THE AFFIDAVIT OF DR. JAI RAJ N. RAJAN |
| XNRC-012 | 12/13/83 | NRC STAFF RESPONSE TO CASE'S MOTION FOR RECONSIDERATION (AFFIDAVITS ON OPEN ITEMS RELATING TO WALSH/DOYLE ALLEGATIONS) |
| XNRC-013 | 10/28/83 | NRC STAFF RESPONSE TO BOARD QUESTION REGARDING APPLICABLE WELDING CODES AT CPSES |

| Source Document | Date | Document Title |
|---|---|---|
| XNRC-014 | 09/12/83 | NRC INSPECTION REPORT 50-445/83-24, 50-446/83-15 |
| XNRC-015 | 02/17/83 | LETTER FROM G. L. MADSEN, CHIEF, REACTOR PROJECT BRANCH 1, TO R. J. GARY, EXECUTIVE VICE PRESIDENT AND GENERAL MANAGER, TUGCO |
| XNRC-016 | 04/13/83 | LETTER FROM COUNSEL FOR NRC STAFF TO ASLB IN THE MATTER OF TEXAS UTILITIES GENERATING COMPANY, ET AL. (COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2) DOCKET NOS. 50-445 AND 50-446 |
| XNRC-017 | 03/17/83 | LETTER FROM COUNSEL FOR NRC STAFF TO ASLB IN THE MATTER OF TEXAS UTILITIES GENERATING COMPANY, ET AL. (COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2) DOCKET NOS. 50-445 AND 50-446 |
| XNRC-018 | 02/22/83 | COUNSEL FOR NRC STAFF - IN THE MATTER OF TEXAS UTILITIES GENERATING COMPANY, ET AL. (COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2) DOCKET NOS. 50-445 AND 50-446 |
| XNRC-019 | 02/08/83 | LETTER FROM NRC STAFF COUNSEL TO ASLB IN THE MATTER OF TEXAS UTILITIES GENERATING COMPANY, ET AL. (COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2) DOCKET NOS. 50-445 AND 50-446 |
| XNRC-020 | 02/18/82 | LETTER FROM NRC STAFF COUNSEL TO ASLB IN THE MATTER OF TEXAS UTILITIES GENERATING COMPANY, ET AL. (COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2) DOCKET NOS. 50-445 AND 50-446 |
| XNRC-021 | 03/27/83 | LETTER AND REPORT ENTITLED "REVIEW OF CONCERNS EXPRESSED BY CITIZENS ASSOCIATION FOR SOUND ENERGY ABOUT CONDUCT OF REGION IV INVESTIGATIONS/INSPECTION TO ASLB" |
| XNRC-022 | 11/04/83 | COUNSEL FOR NRC STAFF IN THE MATTER OF TEXAS UTILITIES GENERATING COMPANY, ET AL. (COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2) DOCKET NOS. 50-445 AND 50-446 |

ATTACHMENT A — *Continued*

| Source Document | Date | Document Title |
|---|---|---|
| XNRC-023 | 11/01/83 | COUNSEL FOR NRC STAFF IN THE MATTER OF TEXAS UTILITIES GENERATING COMPANY, ET AL. (COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2) DOCKET NOS. 50-445 AND 50-446 |
| XNRC-024 | 10/14/83 | COUNSEL FOR NRC STAFF IN THE MATTER OF TEXAS UTILITIES GENERATING COMPANY, ET AL. (COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2) DOCKET NOS. 50-445 AND 50-446 |
| XNRC-025 | 12/31/84 | LETTER FROM D. R. HUNTER, CHIEF, REACTOR PROJECT BRANCH 2, TO M. D. SPENCE, PRESIDENT, TUGCO |
| XNRC-026 | 05/17/84 | LETTER FROM COUNSEL FOR NRC STAFF TO ASLB IN THE MATTER OF TEXAS UTILITIES ELECTRIC COMPANY, ET AL. COMANCHE PEAK STEAM ELECTRIC COMPANY, ET AL. (COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2) |
| XNRC-027 | 05/11/84 | ADDENDUM TO PAGE 27 OF NRC STAFF TESTIMONY ON WELDING FABRICATION CONCERNS RAISED BY MR. AND MRS STINES. |
| XNRC-028 | 04/24/84 | LETTER FROM NRC TO APPLICATNT IN THE MATTER OF THE NRC STAFF RECEIVING ALLEGATIONS OF IMPROPER CONSTRUCTION PRACTICES, ET. AL. (COMANCHE PEAK STEAM ELECTRIC COMPANY, UNIT 1 AND 2). DOCKET NS. 50-445 AND 50-446. |
| XTUG-001 | 02/18/87 | APPLICANTS' INTERROGATORIES TO INTERVENER, (SET NO. 1987-4) |
| XTUG-002 | 08/02/83 | APPLICANTS MOTION FOR CLARIFICATION OF MEMORANDUM AND ORDER ON THERMAL STRESS AND PIPE SUPPORTS |
| XTUG-003 | 05/11/83 | APPLICANTS' SUPPLEMENTAL REPLY BRIEF REGARDING PIPE SUPPORT DESIGN |
| XTUG-004 | 05/03/83 | APPLICANTS' REPLY BRIEF REGARDING CONSIDERATION OF LOCA IN DESIGN CRITERIA FOR PIPE SUPPORTS |
| XTUG-005 | 04/21/83 | APPLICANTS' BRIEF REGARDING CONSIDERATION OF THERMAL STRESSES IN DESIGN OF PIPE SUPPORTS |

ATTACHMENT A — *Continued*

| Source Document | Date | Document Title |
|---|---|---|
| XTUG-006 | 07/03/84 | APPLICANTS' STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE RE APPLICANTS' QUALITY ASSURANCE PROGRAM FOR DESIGN OF PIPING AND PIPE SUPPORTS FOR COMANCHE PEAK STEAM ELECTRIC STATION |
| XTUG-007 | 06/29/84 | APPLICANTS' STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE REGARDING CONSIDERATION OF CINCHING U-BOLTS |
| XTUG-008 | 06/18/84 | APPLICANTS' STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE REGARDING CONSIDERATION OF LOCAL DISPLACEMENTS AND STRESSES |
| XTUG-009 | 06/17/84 | APPLICANTS' STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE REGARDING STABILITY OF PIPE SUPPORTS |
| XTUG-010 | 06/02/84 | APPLICANTS' STATEMENT OF MATERIAL FACTS RELATING TO RICHMOND INSERTS AS TO WHICH THERE ARE NO MATERIAL ISSUES |
| XTUG-011 | 05/20/84 | APPLICANTS' STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE |
| XTUG-012 | 05/16/84 | APPLICANTS' STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE |
| XTUG-013 | 05/16/84 | APPLICANTS' STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE REGARDING CONSIDERATION OF FRICTION FORCES IN THE DESIGN OF PIPE SUPPORTS WITH SMALL THERMAL MOVEMENTS |
| XTUG-014 | 05/16/84 | APPLICANTS' STATEMENT OF MATERIAL FACTS AS TO WHICH THERE IS NO GENUINE ISSUE REGARDING APPLICANTS' CONSIDERATION OF DAMPING FACTORS FOR OBE AND SSE LOADING CONDITIONS |
| XTUG-015 | 06/01/83 | COUNSEL FOR TUGCO - RE: TEXAS UTILITIES GENERATING CO., ET AL. (COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2) DOCKET NOS. 50-445 AND 50-446 |
| XTUG-016 | 11/19/84 | APPLICANTS' REPLY TO CASE'S MOTION CONCERNING INFORMATION REGARDING CINCHING DOWN U-BOLTS |

ATTACHMENT A — *Continued*

| Source Document | Date | Document Title |
|---|---|---|
| XTUG-017 | 11/16/84 | APPLICANTS' REPLY TO CASE'S ANSWER TO APPLICANTS' RESPONSE TO BOARD'S PARTIAL INITIAL DECISION REGARDING A500 STEEL |
| XTUG-018 | 11/05/84 | APPLICANTS' MOTION FOR RECONSIDERATION OF MEMORANDUM AND ORDER (MORE DETAIL ON INDIVIDUAL PIPE SUPPORTS) |
| XTUG-019 | 07/11/84 | COUNSEL FOR APPLICANTS RE: TEXAS UTILITIES COMPANY, ET AL. (COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2), DOCKET NOS. 50-445 AND 50-446 |
| XTUG-020 | 06/29/84 | COUNSEL FOR APPLICANTS - SUBJ. TEXAS UTILITIES ELECTRIC, ET AL. (COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2 DOCKET NOS. 50-445 AND 50-446) |
| XTUG-021 | 06/17/84 | LETTER FROM APPLICANTS' COUNSEL TO ASLB - SUBJ. TEXAS UTILITIES COMPANY, ET AL. (COMANCHE PEAK STEAM ELECTRIC STATION, UNITS 1 AND 2) DOCKET NOS. 50-445 AND 50-446 |
| XTUG-022 | 04/11/84 | APPLICANTS' RESPONSE TO PARTIAL INITIAL DECISION REGARDING A500 STEEL |
| XTUG-023 | 06/02/84 | LETTER FROM COUNSEL FOR APPLICANT TO ASLB IN THE MATTER OF ALLEGATIONS REGARDING SAFETY FACTORS, ET. AL. (COMANCHE PEAK STEAM ELECTRIC COMPANY, UNIT 1 AND UNIT 2) DOCKET NOS. 50-445 AND 50-446. |

# ATTACHMENT B
# SUMMARY OF CONDUIT-RELATED DISCREPANCY/ISSUE RESOLUTION (DIR) REPORTS BY EXTERNAL SOURCE AND ISSUE GROUPS

ATTACHMENT B

# SUMMARY OF CONDUIT-RELATED DISCREPANCY/ISSUE RESOLUTION (DIR) REPORTS BY EXTERNAL SOURCE AND ISSUE GROUPS

| Issue Group | External Source | | | | | |
|---|---|---|---|---|---|---|
| | IAP | | | ASLB | NRC | NRCT |
| | IAP-16 | IAP-34 | Other | | | |
| 1 Controlling Load Case for Design | E-0161 | | E-0752 (IAP-32) | | | |
| 2 Dynamic Amplification Factors (DAF) | E-0162 | | | | | E-1020 (NRCT-3) E-0255 (NRCT-17) |
| 3 Seismic Response Combination Method | E-0163 | | | | | |
| 4 Measurement of Embedment From Top of Topping | E-0164 | | | | | |
| 5 Non-Conformance with AISC Specifications | E-0165 | E-1171 | E-0761 (IAP-32) | | | |
| 6 Appropriate FSAR Load Combinations | E-0166 | | E-0753 (IAP-32) | | | E-0257 (NRCT-17) |
| 7 Support Self-Weight | E-0167 | | E-0757 (IAP-32) | | | |
| 8 Unistrut Design | E-0168 | | E-0762 (IAP-32) E-0758 (IAP-32) | | | |
| 9 Improper Use of Catalog Components | E-0169 | E-1163 | E-0763 (IAP-32) | | | |

ATTACHMENT B — *Continued*

| Issue Group | External Source | | | | | |
|---|---|---|---|---|---|---|
| | IAP | | | ASLB | NRC | NRCT |
| | IAP-16 | IAP-34 | Other | | | |
| 10 Anchor Bolt Design | E-0169 | E-1164<br>E-1165<br>E-1166 | E-0760 (IAP-32)<br>E-0759 (IAP-32) | | | |
| 11 Longitudinal Loads on Transverse Supports | E-0171 | | E-0756 (IAP-32) | | | |
| 12 Hilti Kwik Bolt Substitutions | E-0172 | | E-0759 (IAP-32) | | | |
| 13 Substitution of Smaller Conduits on CA-type Supports | E-0173 | | | | | |
| 14 Use of CA-type Supports in LS-Spans | E-0174 | | E-0755 (IAP-32) | | | |
| 15 Conduit Supports Attached to Cable Trays | E-0175 | | | | | |
| 16 Increases in Allowable Span Lengths | E-0176 | | | | | |
| 17 Substitution of Next Heavier Structural Member | E-0177 | | E-0759 (IAP-32) | | | |
| 18 Clamp Usage | E-0178 | E-1167<br>E-1170 | | | | |

ATTACHMENT B — *Continued*

| Issue Group | External Source | | | | | |
|---|---|---|---|---|---|---|
| | IAP | | | ASLB | NRC | NRCT |
| | IAP-16 | IAP-34 | Other | | | |
| 19<br>Documentation Deviations Between Inspection Reports, CMC's and IN-FP Drawings | | E-1168<br>E-1169 | | | | |
| 20<br>Nelson Studs | E-0179 | | | | | |
| 21<br>Conduit Fire Protection Calculations | E-0180 | E-1158<br>E-1159<br>E-1160 | | | | |
| 22<br>Span Increase for Fire Protected Spans | E-0181 | | | | | |
| 23<br>Grouted Penetrations | E-0182 | | | | | |
| 24<br>Rigidity of CA-type Supports | E-0183 | | | | | |
| 25<br>Enveloping Configurations for Design | | E-1157 | E-0759<br>(IAP-32) | | | |
| 26<br>Design Drawing Discrepancies | | E-1156 | | | | |
| 27<br>Walkdown Discrepancies | | E-1155 | | | E-1001<br>(NRC-20) | |
| 28<br>Systems Concept | | E-1154 | | | | |
| 29<br>Cumulative Effect of Review Issues | E-0184 | | E-0754<br>(IAP-32)<br>E-0272<br>(TUGCO-36) | | | E-1030<br>(NRCT-12) |

# ATTACHMENT C
# PROJECT AND THIRD PARTY DOCUMENT/ISSUE CROSS-REFERENCE LIST

# ATTACHMENT C
## PROJECT AND THIRD PARTY DOCUMENT/ISSUE CROSS-REFERENCE LIST

| Project Document | | Relevant External Source Issue Groups (s) | Third Party Review Document | |
|---|---|---|---|---|
| **1. DESIGN CRITERIA** | | | | |
| SAG.CP2 | [7.2.1] | 1, 2, 3, 6, 7, 9, 10, 11, 18, 20, 22, 23, 25 | DAP-CLC-C/S-607 | [7.3.34] |
| | | | DAP-E-C/S-305 | [7.4.16] |
| | | | DAP-E-C/S-307 | [7.4.18] |
| SAG.CP10 | [7.2.2] | 1, 2, 3, 4, 6, 7, 9, 10, 11, 13, 14, 15, 16, 18, 20, 21, 22, 23, 24, 25 | DAP-CLC-C/S-609 | [7.4.36] |
| | | | DAP-E-C/S-305 | [7.4.16] |
| | | | DAP-E-C/S-307 | [7.4.18] |
| SAG.CP12 | [7.2.3] | 1, 2, 3, 6, 7, 10 | DAP-CLC-C/S-605 | [7.4.32] |
| | | | DAP-E-C/S-311 | [7.4.22] |
| SAG.CP17 | [7.2.4] | 1, 2, 3, 6, 7, 10 | DAP-CLC-C/S-606 | [7.4.33] |
| | | | DAP-E-C/S-311 | [7.4.22] |
| DBD-C/S-22 | [7.2.5] | | DAP-CLC-C/S-608 | [7.4.35] |
| | | | DAP-E-C/S-307 | [7.4.18] |
| **2. WALKDOWN PROCEDURES** | | | | |
| CPE-EB-FVM-C/S-002 | [7.1.3] | 10, 12, 18 | DAP-E-C/S-302 | [7.4.13] |
| CPE-EB-FVM-C/S-014 | [7.1.4] | 4, 5, 10, 12, 13, 14, 17, 18, 19, 27 | DAP-E-C/S-301 | [7.4.12] |
| CPE-EB-FVM-C/S-033 | [7.1.5] | 4, 5, 10, 12, 13, 14, 17, 18, 19, 21, 22, 27 | DAP-E-C/S-301 | [7.4.12] |
| **3. DESIGN PROCEDURES** | | | | |
| SAG.CP14 | [7.2.6] | | DAP-E-C/S-316 | [7.4.27] |
| SAG.CP20 | [7.2.7] | 2, 16 | DAP-CLC-C/S-604 | [7.4.31] |
| | | | DAP-E-C/S-313 | [7.4.24] |
| SAG.CP21 | [7.2.8] | 6 | DAP-E-C/S-305 | [7.4.16] |
| SAG.CP22 | [7.2.9] | 6 | DAP-E-C/S-305 | [7.4.16] |
| SAG.CP25 | [7.2.10] | 1, 3, 10, 12, 13, 14, 15, 16, 17, 19, 20, 21, 23, 29 | DAP-E-C/S-314 | [7.4.25] |
| | | | DAP-E-C/S-310 | [7.4.21] |
| SAP.CP 29 | [7.2.11] | 3, 5, 10, 25 | DAP-E-C/S-307 | [7.4.18] |
| | | | DAP-CLC-C/S-602 | [7.4.29] |
| SAG.CP35 | [7.2.12] | | DAP-E-C/S-312 | [7.4.23] |
| CP-SG-01 | [7.2.13] | | DAP-E-C/S-303 | [7.4.14] |
| CP-SG-02 | [7.2.14] | 1, 3, 10, 12, 20, 23, 29 | DAP-E-C/S-314 | [7.4.25] |
| CP-SG-03 | [7.2.15] | 3, 5, 10, 25 | DAP-E-C/S-307 | [7.4.18] |
| Book #8 | [7.2.16] | 2 | DAP-CLC-C/S-798 | [7.4.55] |
| | | | DAP-E-C/S-313 | [7.4.24] |
| SUPT-0231 | [7.2.17] | | DAP-CLC-C/S-603 | [7.4.30] |
| | | | DAP-E-C/S-307 | [7.4.18] |
| SPAN-1008 | [7.2.18] | | DAP-CLC-C/S-601 | [7.4.28] |
| Quality of Construction Position Paper | [7.2.19] | 5, 19, 27 | DAP-E-C/S-309 | [7.4.20] |

| Project Document | | Relevant External Source Issue Groups (s) | Third Party Review Document | |
|---|---|---|---|---|
| **4. SPECIAL STUDIES** | | | | |
| **4a. Unit 1** | | | | |
| Book SPAN-1001 | [7.2.20] | | DAP-CLC-C/S-707 | [7.4.43] |
| | | | DAP-E-C/S-313 | [7.4.24] |
| | | | DAP-E-C/S-314 | [7.4.25] |
| Book SPAN-1002 | [7.2.21] | | DAP-CLC-C/S-702 | [7.4.38] |
| Book SPAN-1004 | [7.2.22] | | DAP-CLC-C/S-705 | [7.4.41] |
| Book SPAN-1005 | [7.2.23] | | DAP-CLC-C/S-802 | [7.4.59] |
| Book SPAN-1006 | [7.2.24] | | DAP-CLC-C/S-809 | [7.4.66] |
| Book SPAN-1007 | [7.2.25] | | DAP-CLC-C/S-709 | [7.4.45] |
| Book SPAN-1009 | [7.2.26] | | DAP-CLC-C/S-808 | [7.4.65] |
| Book SPAN-1010 | [7.2.27] | | DAP-CLC-C/S-710 | [7.4.46] |
| Book SPAN-1012 | [7.2.28] | | DAP-E-C/S-313 | [7.4.24] |
| | | | DAP-E-C/S-314 | [7.4.25] |
| Book SPAN-1113 | [7.2.29] | | DAP-CLC-C/S-832 | [7.4.89] |
| Book SPAN-1189 | [7.2.30] | 7 ,17 | DAP-E-C/S-307 | [7.4.18] |
| | | | DAP-E-C/S-313 | [7.4.24] |
| | | | DAP-E-C/S-314 | [7.4.25] |
| Book SPAN-1192 | [7.2.31] | | DAP-E-C/S-313 | [7.4.24] |
| Book SPAN-1193 | [7.2.32] | | DAP-E-C/S-313 | [7.2.24] |
| Book SPAN-1199 | [7.2.33] | 22 | DAP-E-C/S-313 | [7.4.24] |
| Book SPAN-1200 | [7.2.34] | 18 | DAP-E-C/S-308 | [7.4.19] |
| Book SUPT-0041 | [7.2.35] | | DAP-CLC-C/S-704 | [7.4.40] |
| Book SUPT-0211 | [7.2.36] | | DAP-CLC-C/S-703 | [7.4.39] |
| Book SUPT-0221 | [7.2.37] | | DAP-CLC-C/S-708 | [7.4.44] |
| Book SUPT-0233 | [7.2.38] | | DAP-CLC-C/S-701 | [7.4.37] |
| Book SUPT-0236 | [7.2.39] | | DAP-CLC-C/S-813 | [7.4.70] |
| Book SUPT-0246 | [7.2.40] | 5 | DAP-CLC-C/S-823 | [7.4.80] |
| | | | DAP-E-C/S-309 | [7.4.20] |
| Book SUPT-0247 | [7.2.41] | 17 | DAP-E-C/S-307 | [7.4.18] |
| Book SUPT-0253 | [7.2.42] | 5 | DAP-E-C/S-309 | [7.4.20] |
| Book THER-1751(I) | [7.2.43] | 6 | DAP-E-C/S-311 | [7.4.22] |
| Book THER-1751(II) | [7.2.44] | 6 | DAP-E-C/S-311 | [7.4.22] |
| Book THER-1760 | [7.2.45] | 6 | DAP-E-C/S-305 | [7.4.16] |
| Book THER-1761 | [7.2.46] | 6 | DAP-E-C/S-305 | [7.4.16] |
| Book THER-1901 | [7.2.47] | 6 | DAP-CLC-C/S-819 | [7.4.76] |
| | | | DAP-E-C/S-305 | [7.4.16] |
| Book THER-1961 | [7.2.48] | 6 | DAP-E-C/S-305 | [7.4.16] |
| Book THER-1981 | [7.2.49] | 6 | DAP-E-C/S-305 | [7.4.16] |
| Book CP-JB-20 | [7.2.50] | | DAP-CLC-C/S-818 | [7.4.75] |
| Book CP-JB-21 | [7.2.51] | | DAP-CLC-C/S-706 | [7.4.42] |
| Oversize Bolt Holes | [7.2.52] | 5 | DAP-E-C/S-309 | [7.4.20] |
| Minimum Size Fillet Welds | [7.2.115] | | DAP-E-C/S-306 | [7.4.17] |
| Skewed Welds | [7.2.115] | | DAP-E-C/S-315 | [7.4.26] |

| Project Document | | Relevant External Source Issue Groups (s) | Third Party Review Document | |
|---|---|---|---|---|
| **4b. Unit 2** | | | | |
| Book #2 | [7.2.53] | | DAP-CLC-C/S-793 | [7.4.50] |
| Book #5 | [7.2.54] | | DAP-CLC-C/S-794 | [7.4.51] |
| Book #6 | [7.2.55] | | DAP-CLC-C/S-795 | [7.4.52] |
| | | | DAP-E-C/S-307 | [7.4.18] |
| Book #7 | [7.2.56] | | DAP-CLC-C/S-796 | [7.4.53] |
| Book #59 | [7.2.57] | | DAP-CLC-C/S-799 | [7.4.56] |
| Book #60 | [7.2.58] | 10 | DAP-CLC-C/S-807 | [7.4.64] |
| | | | DAP-E-C/S-307 | [7.4.18] |
| Book #78 | [7.2.59] | | DAP-CLC-C/S-797 | [7.4.54] |
| Book #81 | [7.2.60] | 6 | DAP-CLC-C/S-804 | [7.4.61] |
| | | | DAP-E-C/S-305 | [7.4.16] |
| Book #82 | [7.2.61] | 6 | DAP-E-C/S-305 | [7.4.16] |
| Book #84 | [7.2.62] | 6 | DAP-CLC-C/S-805 | [7.4.62] |
| | | | DAP-E-C/S-305 | [7.4.16] |
| Book #85 | [7.2.63] | 6 | DAP-E-C/S-305 | [7.4.16] |
| Book #86 | [7.2.64] | 6 | DAP-E-C/S-305 | [7.4.16] |
| Book #87 | [7.2.65] | 6 | DAP-CLC-C/S-822 | [7.4.79] |
| | | | DAP-E-C/S-305 | [7.4.16] |
| Book #91 | [7.2.66] | 6 | DAP-E-C/S-305 | [7.4.16] |
| Book #92 | [7.2.67] | 6 | DAP-CLC-C/S-839 | [7.4.96] |
| | | | DAP-E-C/S-305 | [7.4.16] |
| | | | DAP-E-C/S-311 | [7.4.22] |
| Book #94 | [7.2.68] | 6 | DAP-CLC-C/S-821 | [7.4.78] |
| | | | DAP-E-C/S-305 | [7.4.16] |
| Book #111 | [7.2.69] | 6 | DAP-CLC-C/S-810 | [7.4.67] |
| | | | DAP-E-C/S-311 | [7.4.22] |
| Book #129 | [7.2.70] | | DAP-CLC-C/S-826 | [7.4.83] |
| Book #132 | [7.2.71] | | DAP-CLC-C/S-817 | [7.4.74] |
| Book #145 | [7.2.72] | 12 | DAP-CLC-C/S-806 | [7.4.63] |
| Book #151 | [7.2.73] | 6, 23 | DAP-CLC-C/S-840 | [7.4.97] |
| | | | DAP-E-C/S-305 | [7.4.16] |
| Book #156 | [7.2.74] | 5 | DAP-E-C/S-309 | [7.4.20] |
| Book #158 | [7.2.75] | 5 | DAP-E-C/S-309 | [7.4.20] |
| **5. GENERIC CALCULATIONS** | | | | |
| **5a. Unit 1** | | | | |
| Book SPAN-1116 | [7.2.76] | 2 | DAP-CLC-C/S-831 | [7.4.88] |
| Book SPAN-1131 | [7.2.77] | 2 | DAP-CLC-C/S-837 | [7.4.94] |
| Book SPAN-1170 | [7.2.78] | 2 | DAP-CLC-C/S-830 | [7.4.87] |
| Book SUPT-1010 | [7.2.79] | 25, 26 | DAP-CLC-C/S-834 | [7.4.91] |
| | | | DAP-E-C/S-307 | [7.4.18] |
| Book SUPT-1020 | [7.2.80] | 25, 26 | DAP-CLC-C/S-836 | [7.4.93] |
| | | | DAP-E-C/S-307 | [7.4.18] |
| Book SUPT-1024 | [7.2.81] | 25, 26 | DAP-CLC-C/S-815 | [7.4.72] |
| | | | DAP-E-C/S-307 | [7.4.18] |
| Book SUPT-1050 | [7.2.82] | 25, 26 | DAP-CLC-C/S-814 | [7.4.71] |
| | | | DAP-E-C/S-307 | [7.4.18] |

| | Project Document | | Relevant External Source Issue Groups (s) | Third Party Review Document | |
|---|---|---|---|---|---|
| | Book SUPT-1226 | [7.2.83] | 25, 26 | DAP-CLC-C/S-835 | [7.4.92] |
| | | | | DAP-E-C/S-307 | [7.4.18] |
| | Book SUPT-1301 | [7.2.84] | 13, 24, 25, 26, 28 | DAP-CLC-C/S-833 | [7.4.90] |
| | | | | DAP-E-C/S-307 | [7.4.18] |
| | Book CP-JB-22-3BT | [7.2.85] | | DAP-E-C/S-311 | [7.4.22] |
| | Book CP-JB-22-15 | [7.2.86] | | DAP-CLC-C/S-829 | [7.4.86] |
| | | | | DAP-E-C/S-311 | [7.4.22] |
| | Book CP-JB-22-16AU | [7.2.87] | | DAP-E-C/S-311 | [7.4.22] |
| | Book CP-JB-22-19E | [7.2.88] | | DAP-E-C/S-311 | [7.4.22] |
| | Book CP-JB-22-20 | [7.2.89] | | DAP-E-C/S-311 | [7.4.22] |
| | Book CP-JB-22-27 | [7.2.90] | | DAP-E-C/S-311 | [7.4.22] |
| 5b. | **Unit 2** | | | | |
| | Book 10 | [7.2.91] | 25, 26, 28 | DAP-CLC-C/S-828 | [7.4.85] |
| | | | | DAP-E-C/S-307 | [7.4.18] |
| | Book 11 | [7.2.92] | 25, 26 | DAP-CLC-C/S-790 | [7.4.47] |
| | | | | DAP-E-C/S-307 | [7.4.18] |
| | Book 13 | [7.2.93] | 25, 26, 28 | DAP-CLC-C/S-801 | [7.4.58] |
| | | | | DAP-E-C/S-307 | [7.4.18] |
| | Book 23 | [7.2.94] | 25, 26 | DAP-CLC-C/S-800 | [7.4.57] |
| | | | | DAP-E-C/S-307 | [7.4.18] |
| | Book 27 | [7.2.95] | 25, 26 | DAP-CLC-C/S-791 | [7.4.48] |
| | | | | DAP-E-C/S-307 | [7.4.18] |
| | Book 30 | [7.2.96] | 25, 26 | DAP-CLC-C/S-803 | [7.4.60] |
| | | | | DAP-E-C/S-307 | [7.4.18] |
| | Book 36 | [7.2.97] | 2 | DAP-CLC-C/S-825 | [7.4.82] |
| | Book 41 | [7.2.98] | 2 | DAP-CLC-C/S-816 | [7.4.73] |
| | Book 44 | [7.2.99] | 20, 25, 26 | DAP-CLC-C/S-811 | [7.4.68] |
| | | | | DAP-E-C/S-307 | [7.4.18] |
| | Book 48 | [7.2.100] | 25, 26 | DAP-CLC-C/S-792 | [7.4.49] |
| | | | | DAP-E-C/S-307 | [7.4.18] |
| | Book 55 | [7.2.101] | 25, 26 | DAP-CLC-C/S-827 | [7.4.84] |
| | | | | DAP-E-C/S-307 | [7.4.18] |
| | Book 57 | [7.2.102] | 25, 26, 28 | DAP-CLC-C/S-828 | [7.4.85] |
| | | | | DAP-E-C/S-307 | [7.4.18] |
| | Book 61 | [7.2.103] | 2 | DAP-CLC-C/S-820 | [7.4.77] |
| | Book 69 | [7.2.104] | 2 | DAP-CLC-C/S-812 | [7.4.69] |
| | Book 123-1 | [7.2.105] | | DAP-E-C/S-311 | [7.4.22] |
| | Book 123-4 | [7.2.106] | | DAP-E-C/S-311 | [7.4.22] |
| | Book 127 | [7.2.107] | | DAP-CLC-C/S-838 | [7.4.95] |
| | | | | DAP-E-C/S-314 | [7.4.25] |
| | Book 133 | [7.2.108] | 25, 26 | DAP-CLC-C/S-824 | [7.4.81] |
| | | | | DAP-E-C/S-307 | [7.4.18] |
| 6. | **TEST PROGRAMS** | | | | |
| | CCL #1903.29-1 | [7.3.1] | | DAP-E-C/S-316 | [7.4.27] |
| | CCL A-678-85 | [7.3.2] | 1, 8, 9, 10, 11, 13, 21, 24, 25, 28 | DAP-E-C/S-304 | [7.4.15] |
| | TNE-C/S-CA-CA-1a | [7.2.109] | 1, 8, 9, 10, 11, 13, 21, 24, 25 | DAP-E-C/S-304 | [7.4.15] |

ATTACHMENT C — *Continued*

| Project Document | | Relevant External Source Issue Groups (s) | Third Party Review Document | |
|---|---|---|---|---|
| TNE-C/S-CA-CA-2b | [7.2.110] | 1, 8, 9, 10, 11, 13, 21, 24, 25 | DAP-E-C/S-304 | [7.4.15] |
| TNE-C/S-CA-JA-1 | [7.2.111] | 1, 8, 9, 11 | DAP-E-C/S-304 | [7.4.15] |
| CCL A-699-85 | [7.3.3] | 5, 9, 18, 20, 27 | DAP-E-C/S-308 | [7.4.19] |
| CCL A-702-86 | [7.3.4] | 5, 9, 18, 20, 27 | DAP-E-C/S-308 | [7.4.19] |

# ATTACHMENT D

# ABBREVIATIONS AND ACRONYMS LIST

ATTACHMENT D

ABBREVIATIONS AND ACRONYMS LIST

| Abbreviation or Acronym | Explanation |
|---|---|
| AISC | American Institute of Steel Construction |
| AISI | American Iron and Steel Institute |
| ANCO | Anco Engineers |
| ASLB | Atomic Safety and Licensing Board |
| C/S-CAP | Civil/Structural Corrective Action Program |
| CASE | Citizens Association for Sound Energy |
| CCL | Corporate Consulting and Development Company, LTD. |
| CMC | Component Modification Card |
| CPRT | Comanche Peak Response Team |
| CPSES | Comanche Peak Steam Electric Station |
| CTH | Cable Tray Hanger |
| CYGNA | Cygna Energy Services |
| DAF | Dynamic Amplication Factor |
| DAP | Design Adequacy Program |
| DIR | Discrepancy/Issue Resolution Report |
| DSAP | Discipline Specific Action Plan |
| EBASCO | Ebasco Services Incorporated |
| ESM | Equivalent Static Method |
| FSAR | Final Safety Analysis Report |
| IAP | Independent Assessment Program |
| IN-FP | Individually Engineered (Support) - Fire Protected |
| IR | Inspection Rport |
| ISAP | Issue Specific Action Plan |
| NRC | United States Nuclear Regulatory Commission |
| OBE | Operating Base Earthquake |
| PCHVP | Post Construction Hardware Validation Program |
| QA | Quality Assurance |
| QC | Quality Control |

| Abbreviation or Acronym | Explanation |
|---|---|
| RSM | Response Spectrum Method |
| SSER | Supplemental Safety Evaluation Report |
| SAT | Satisfactory |
| SER | Safety Evaluation Report |
| SRSS | Square Root Sum of the Squares |
| SSE | Safe Shutdown Earthquake |
| SWEC | Stone and Webster Engineering Corporation |
| UNSAT | Unsatisfactory |