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C A S E

(CITIZENS ASSN. FOR SOUND ENERGY)

1426 S. Polk
Dallas, Texas 75224

214/946-9446

May 17, 1988

Administrative Judge Peter B. Bloch
U. S. Nuclear Regulatory Commission
Atomic Safety and Licensing Board
Washington, D. C. 20555

Dr. Walter H. Jordon
881 W. Outer Drive
Oak Ridge, Tennessee 37830

Dr. Kenneth A. McCollom
1107 West Knapp Street
Stillwater, Oklahoma 74075

Elizabeth B. Johnson
Oak Ridge National Laboratory
P. O. Box X, Building 3500
Oak Ridge, Tennessee 37830

Dear Administrative Judges:

Subject: In the Matter of
Texas Utilities Electric Co., et al.
Comanche Peak Steam Electric Station
Units 1 and 2

Application for an Operating License
Docket Nos. 50-445-OL and 50-446-OL
and
Construction Permit Amendment
Docket No. 50-445-CPA

As part of CASE's continuing efforts to comply with the Board's wishes to be kept informed of potentially significant information relating to these proceedings, we are enclosing herewith of the January 6, 1988, letter from Phillip F. McKee, Deputy Director, Comanche Peak Project Division, NRC Office of Special Projects, to S. M. A. Hasan regarding his concerns. We have now obtained authorization from both Mr. Hasan and his attorney to send this information to the Board. As stated in the NRC Staff's letter:

> The purpose of this letter is to inform you that the NRC has completed its technical review of this matter and our findings are provided in Enclosure 1, Staff Evaluation of Pipe Support Allegations. Also enclosed is a copy of NRC's May 28, 1987 letter to TUEC requesting their assessment of the allegations (Enclosure 2) and a copy of TUEC's July 2, 1987 response (Enclosure 3).

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The technical concerns you raised were similar to the pipe support design issues raised in the Atomic Safety Licensing Board proceedings by CASE, and in the Independent Assessment Program conducted by Cygna Engineering Services. These issues, in part, played a major role in the development of the Comanche Peak Response Team Program Plan and in the subsequent establishment of the Corrective Action Program for piping and pipe supports as conducted by Stone and Webster Engineering Corporation (SWEC). As discussed in our evaluation, this program has directly addressed most of the concerns you raised and, to a large extent, has substantiated your allegations. The NRC is continuing to closely monitor the implementation of the activities under this program which are expected to resolve these concerns.

CASE is filing this report in both the operating license (OL) and construction permit (CPA) proceedings, since we believe they are relevant to both.

Respectfully submitted,

CASE (CITIZENS ASSOCIATION FOR SOUND ENERGY)

Juanita Ellis

(Mrs.) Juanita Ellis
President and Co-Representative

cc: Service List, with Enclosures

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

January 6, 1988

S. M. A. Hasan
3101 West Normandale, #2070
Fort Worth, TX 76116

Dear Mr. Hasan:

Subject: Allegation No. OSP-86-A-0148 (4-86-A-005)

Our records indicate that on two occasions, January 10, 1986 and January 30, 1986, you met with NRC representatives to discuss concerns related to possible design deficiencies of piping and pipe supports at the Comanche Peak plant. Mrs. Juanita Ellis, President of Citizens Association for Sound Energy (CASE), and others were also present at the two meetings.

The transcripts of the two meetings with you were reviewed by the staff and on July 31, 1986 a list of technical concerns extracted from the transcripts was provided to Juanita Ellis on your behalf. A copy of the list was also sent to Ms. Billie P. Garde. These lists were provided to the above parties to confirm the NRC's intent to maintain your confidentiality in its transmittal of the list to Texas Utilities Electric Company (TUEC) for their assessment and to ensure, through your review, that the substance of your concerns was accurately described.

The purpose of this letter is to inform you that the NRC has completed its technical review of this matter and our findings are provided in Enclosure 1, Staff Evaluation of Pipe Support Allegations. Also enclosed is a copy of NRC's May 28, 1987 letter to TUEC requesting their assessment of the allegations (Enclosure 2) and a copy of TUEC's July 2, 1987 response (Enclosure 3).

The technical concerns you raised were similar to the pipe support design issues raised in the Atomic Safety Licensing Board proceedings by CASE, and in the Independent Assessment Program conducted by Cygna Engineering Services. These issues, in part, played a major role in the development of the Comanche Peak Response Team Program Plan and in the subsequent establishment of the Corrective Action Program for piping and pipe supports as conducted by Stone and Webster Engineering Corporation (SWEC). As discussed in our evaluation, this program has directly addressed most of the concerns you raised and, to a large extent, has substantiated your allegations. The NRC is continuing to closely monitor the implementation of the activities under this program which are expected to resolve these concerns.

To facilitate the staff's review and to evaluate the significance of the allegations, the 65 allegations were grouped into nine allegation categories. The results of the staff's review of the nine categories of allegations, which encompassed all 65 concerns, is presented in Enclosure 1. Based on our evaluation of the concerns and based on our review of TUEC's July 2, 1987 letter which

responded to the 65 concerns, the staff finds that the allegations, both individually and collectively, have been adequately addressed. Please note that on item 8 of Enclosure 1, the staff's assessment is contingent upon acceptable findings by Cygna Energy Services (an independent design review organization) and the staff in the review of piping design control.

We appreciate the time and effort you have taken to bring these concerns to our attention. Further, we believe that the applicant's actions in this matter have been responseive and will lead to resolutions consistent with NRC requirements. Should you wish to be informed in the future about the final outcome of the staff's assessment on item 8, noted above, please let us know.

Phillip F. McKee, Deputy Director
Comanche Peak Project Division
Office of Special Projects

Enclosures:
1. Staff Evaluation
2. Letter Request to TUEC, 5/28/87
3. TUEC Response, TXX-6535

cc w/encls.:
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Citizens Association for Sound Energy
1426 S. Polk
Dallas, TX 75224

Ms. Billie P. Garde
Government Accountability Project
1555 Connecticut Avenue, N.W.
Washington, DC 20036

Staff Evaluation of Pipe Support Allegations

The following nine collective allegation categories have been evaluated by the staff and our findings are summarized below. The "Concern Nos." are the same as those used in the staff's May 28, 1987 and the applicant's July 2, 1987 letters.

1. Inadequate or lack of design criteria or procedures

Concern Nos. 2, 3, 7, 8, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 22, 25, 27, 30, 35, 36, 37, 38, 46, 47, 48, 49, 55, 58, 60, 63, 64.

Based on our review of the above concerns, we find that the alleger's concerns pertain to the pipe support design criteria and design procedures which existed prior to the development by SWEC of the Comanche Peak Project Procedure (CPPP)-7, "Design Criteria for Pipe Stress and Pipe Supports." We find that the SWEC design criteria (CPPP-7) adequately address the alleger's technical concerns listed above. Any identified design deficiencies which may have occurred as a result of inadequate, or lack of, pipe support design criteria in the past will be corrected by the SWEC piping and pipe support design activities. The specific design criterion from CPPP-7 applicable to each of the above concerns is identified in the applicant's July 2, 1987 letter. Thus, the staff finds that the collective allegation associated with inadequate or lack of design criteria or design procedures has been acceptably resolved through the development of the SWEC design criteria (CPPD-7).

2. Inadequate review of design or calculation

Concern Nos. 1, 4, 6, 7, 39, 44, 48, 59

Based on our review of the above concerns, we find that the alleger's concerns pertain to the review of pipe support designs and calculations performed prior to the SWEC piping and pipe support requalification program (now under the TU Electric Corrective Action Program). The pipe support designs and calculations for all ASME Code Class 1, 2, and 3 piping systems are currently being requalified by SWEC using the design criteria and SWEC-controlled computer programs. Upon completion of the SWEC effort, the design validation effort will have reviewed and independently qualified all safety-related pipe supports designed and reviewed by any of the previous pipe support engineering groups. Detailed checklists are required per CPPP-5/9 and CPPP-23 for review and final reconciliation of pipe support calculations. Thus, the staff finds that the collective allegation associated with inadequate review of pipe support designs and calculations has been adequately resolved.

3. Poor implementation of design criteria and procedures

Concern Nos. 3, 9, 14, 15, 16, 26, 32, 34, 40, 45, 50, 61

Based on our review of the above concerns, the staff finds that the alleger's concers pertain to the manner in which the pipe support design criteria and procedures were implemented by the site engineering groups prior to the SWEC piping and pipe support requalification program. The

pipe support calculations for all ASME Code Class 1, 2, and 3 piping systems are currently being requalified by SWEC using the design criteria in CPPP-7. Any identified design deficiencies which may have occurred due to poor implementation of design criteria will be corrected. The implementation of the design criteria in CPPP-7 are reviewed by SWEC using detailed checklists per CPPP-6/9 and CPPP-23. In addition, independent design reviews of the implementation of the design criteria by SWEC are being conducted by SWEC Engineering Assurance and the TU Electric Technical Audit Program. Thus, the staff finds that the collective allegation associated with poor implementation of design criteria and design procedures has been adequately resolved through the establishment of the TU Electric Corrective Action Program for piping and pipe supports.

4. Lack of training

Concern No. 5

Based on our review of this concern, the staff finds that the alleger's concern pertains to the lack of training of pipe support designers in the past to the computer program PSDI-STRUDL. All ASME Code Class 1, 2, and 3 pipe supports will be requalified using SWEC-controlled computer programs STRUDL-SW, STRUDAT, and SANDUL. Any identified pipe support design deficiencies which may have occurred as a result of improper computer use of PSDI-STRUDL in the past will be corrected. As stated in applicant's July 2, 1987 letter, training is given to SWEC design engineers on the use of the SWEC computer programs. Thus, the staff concludes that the alleger's concern associated with lack of training in the use of PSDI-STRUDL has been adequately resolved.

5. Inconsistent design criteria

Concern Nos. 8, 9, 21, 23, 24, 28, 42, 43, 47, 57, 58, 61

Based on our review of the above concerns, the staff finds that the alleger's concerns pertain to the use of different pipe support design criteria by the various pipe support design groups previously involved at CPSES. When the SWEC piping and pipe support requalification program was initiated, the design of pipe supports became the responsibility of a single design organization (SWEC). Only one design criteria document (CPPP-7) is being used for the requalification of all ASME Code Class 1, 2, and 3 pipe supports at CPSES. Any identified deficiencies which might have resulted from the use of inconsistent design criteria will be corrected. Thus, the staff finds that the collective allegation associated with the use of inconsistent pipe support design criteria by the previous design groups has been adequately resolved.

6. Poor design configuration

Concern Nos. 13, 20, 39, 41, 46, 48, 51, 65

Based on our review of the above concerns, the staff finds that the alleger's concerns pertain to the pipe support designs which existed prior to the SWEC piping and pipe support requalification program. As part of this program, SWEC will review all ASME Code Class 1, 2, and 3 pipe support designs (including gang supports) for structural adequacy and for stability. Any identified design deficiencies which may have

resulted due to inadequate design configurations will be corrected by the SWEC design activities. Thus, the staff finds that the collective allegation associated with inadequate design configurations has been adequately resolved.

7. Inaccurate as-built documentation

Concern Nos. 29, 23, 54, 56

Based on our review of the above concerns, the staff finds that the alleger's concerns pertain to as-built pipe support documentation which existed at CPSES prior to the implementation of 1) the SWEC piping and pipe support as-built walkdowns, 2) the ERC Quality of Construction (QOC) Program, and 3) the (Post-Construction) Hardware Validation Program (HVP). These programs, when completed, will ensure that the as-installed pipe support attributes (e.g., weld configuration) required to ensure the structural integrity of the support are accurately reflected on the design drawings. Thus, the staff finds that the collective allegation associated with inaccurate as-built documentation has been adequately resolved.

8. Inadequate design control

Concern Nos. 31, 44, 47, 52, 53, 54, 61, 62

Based on our review of the above concerns, the staff finds that the alleger's concerns pertain to the adequacy of pipe support design control which existed prior to the SWEC piping and pipe support requalification effort. SWEC has since issued several procedures and project memoranda to ensure adequate design control. The procedures and project memoranda which specifically address the alleger's concerns listed above are identified in the applicant's July 2, 1987 letter. Although the staff finds the specific design control concerns of the alleger to be resolved based on the SWEC requalification of all safety-related pipe supports, the staff is continuing to review the adequacy of design control as implemented by SWEC in the piping corrective action program. In addition, Cygna Energy Services, as part of an Independent Assessment Program, is currently reviewing the issue of design control as it existed in the past and will address the adequacy of corrective action measures taken by the applicant to preclude recurrence of past deficiencies in design control. Thus, contingent upon acceptable findings by Cygna and the staff in the review of piping design control, the staff finds that the collective allegation associated with past design control deficiencies has been adequately resolved.

9. Lack of management concern/poor management practice

Concern Nos. 6, 9, 23, 39, 44, 51, 57, 58, 61, 62

Based on our review of the above concerns, the staff finds that the alleger's concerns pertain to the improper actions taken by TUGCO pipe support managers at the CPSES which may have affected pipe support designs prior to the SWEC piping and pipe support requalification program. The pipe support calculations for all ASME Code Class 1, 2, and 3 piping systems are currently being requalified by SWEC at their office in Boston (MA), New York (NY), Cherry Hill (NJ), Torento (Canada), Houston (TX), and at the CPSES site. The previous TUGCO engineering organization

has been dissolved and a new TU Electric engineering organization has been formed. The most significant change which bears on this allegation is that TU Electric no longer directly supervises the technical work of the pipe support engineers but rather monitors and oversees the daily administrative activities. The direct technical supervision of SWEC pipe support engineers is now performed under the SWEC organization. As a result, the pipe support design activities are controlled by SWEC using SWEC procedures. Any technical questions which might arise from the implementation of the SWEC design criteria will be resolved by SWEC in accordance with established procedures. Thus, the staff finds that the collective allegation associated with improper TUGCO management actions affecting pipe support designs has been adequately resolved.

Enclosure 2

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

May 28, 1987

Docket Nos. 50-445
and 50-446

Mr. William G. Counsil
Executive Vice President
Texas Utilities Electric Company
400 North Olive Street, L.B. 81
Dallas, Texas 75201

Dear Mr. Counsil:

SUBJECT: ALLEGATIONS OF DESIGN AND CONSTRUCTION DEFICIENCIES

The staff has received allegations, from a confidential alleger, as enclosed, pertaining to the Comanche Peak Steam Electric Station, Units 1 and 2. We have presented the questions, after consulting with the alleger's counsel, in an effort to protect the alleger's confidentiality. You are requested to review the allegations and conduct appropriate inspections and/or evaluations as necessary.

Substantiated allegations may warrant corrective actions. We request that you inform us, within 30 days of receipt of this letter, of your initial assessment of these allegations and the actions you intend to take. We intend to inspect related activities and audit the records of your completed actions.

Please contact us should you have any questions regarding this matter.

Sincerely,

CIGrimes

Christopher I. Grimes, Director
Comanche Peak Project Division
Office of Special Projects

Enclosure:
As stated

cc: See next page

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Comanche Peak Steam Electric Station
Units 1 and 2

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ENCLOSURE

LIST OF CONCERNS

Item #	Description of Concern
1	The documentation on the project has been described as "hopeless" and it is imperative that the calculations and drawings be totally reviewed, since the standard review process cannot reveal all the safety flaws.
2	The NPS design manual should be reviewed to determine whether the provisions for punching shear are acceptable and meet specification requirements.
3	The April and August 1985 versions of STRUDL were not being used correctly by the pipe support engineers. Examples are (1) slenderness ratio defaulted to K=1, unless specified as some value which most analysts omitted, and (2) local effects (web crippling, effect of holes in structural tube steel, punching shear calculations, etc.) which cannot be obtained directly from STRUDL output were not being evaluated correctly (manual calculations).
4	There is a problem with frame SB3-2 in Unit 2 concerning STRUDL, the design was analyzed without the STRUDL being checked. There was a 24 inch discrepancy in a member length.
5	No training was given to engineers on PSDI STRUDL concerning Code check features, such as slenderness ratio. This was significant, since there were more than thirty different items that had to be checked.
6	There was a lack of management concern for the requirement to check and sign the STRUDL computer printout. There were examples of situations where engineers were required to sign the outputs without having checked it.
7	Embedded plates were failing using the loads from the unchecked STRUDL, and also with the loads from the revised STRUDL. This concern is connected to the concern of the large frame SB3-2.
8	Until August 16, 1985, different pipe support groups applied different criteria to Richmond insert design. The design consisting of Richmond inserts going through structural tubes is not a good design. It is thought that this design concept has not been tested dynamically.

Note: Acronym list is attached for reference.

Item #	Description of Concern
9	A designer was told to only use tension & shear for bolt interaction (for Richmond insert and bolt [rod] design) while other groups were also considering bolt bending. When brought to the attention of the group supervisor, he indicated that the bolt design should be performed as directed (No specific design).
10	A DCA exists that allows the designer to use far higher allowables loads for Richmond inserts for emergency conditions than for normal condition (No specific DCA).
11	There is a concern that the boundary conditions between the Richmond insert and the concrete surface (i.e. fully or partially fixed) have not been satisfactorily established (No specific design).
12	Richmond insert testing currently being done is too limited, since interactions on the Richmond insert rods may be as high as .8. Full scale testing on site should be performed or accurate experimental work done at various university laboratories.
13	Alleger states that his real problem is not Richmond insert per se, but rather with their use in non standard connections like tube steel rather than baseplates.
14	A higher allowable load was used for Richmond inserts and the associated rods under emergency loadings during 1983 or 1984. This approach is not correct and should be investigated (No specific design).
15	A review of the calculations for Richmond inserts indicated that on numerous occasions the Richmond insert spacing was not properly considered while applying the allowable loads. Since the spacing requirements for Richmond inserts is defined in the design specification, this indicates that the procedures were not being followed (No specific design).
16	The allowable loads for Richmond Inserts and the associated rods are different due to material and testing considerations. However, the Richmond insert allowable was often incorrectly used for the rods (No specific design).

Item #	Description of Concern
17	There is a question as to the validity of the use of the specified allowable loads for the spacing of adjacent Hilti bolts when the spacing is less than 10 bolt diameters. This should be investigated (No specific design).
18	There is a question as to the allowable load that should be used for the design of Hilti bolts when they are located near equipment that vibrates. If a higher factor of safety is to be used, the basis for this allowable load should be explained (No specific design).
19	There is a concern that a minimum size baseplate should be used on the CPSES project. Other projects have a 3/4" minimum plate thickness by specification. There are some large structural frames at Comanche Peak that have baseplates as thin as 3/8", which can cause warpage in the baseplate due to welding (No specific design).
20	A question has been raised concerning the design/ tructural adequacy of a support structure contained in a remodification package of about 100 supports selected by the CPRT. The sketch is shown as Exhibit No. 1.
21	There is a concern that different allowable pipe anchor deflections exists for the various pipe support groups. One group uses .005" while another group uses .(3" or 1/16 of an inch. The allowable pipe anchor deflection should be governed by the appropriate procedures.
22	There is a concern that the frequency of the sketch shown in Exhibit 1 is inadequate, since the frequency is relatively low, only 7 or 8 Hz (in the unrestrained direction). Also at one time there was a mandatory requirement that each support should have a frequency of a least 20 Hz. This was removed from the criteria when many supports were not meeting this requirement (refer to Item 20).
23	There is a concern that if supports did not meet the appropriate design criteria using the NPS design specification, the supports were sent to another pipe support design group, such as PSE, and would be considered acceptable using different design criteria. This condition indicates that different design criteria was used in the various pipe support design groups (NPS, ITT-G and PSE). (Criteria may be different for Richmond Insert loads).

Item #	Description of Concern
24	There is a concern that the value of the coefficient of friction and the method for determining the normal condition load is different among the various pipe support design groups. Again this indicates different groups using different criteria (See concern 23 above). For example, the values of the friction coefficient used on the project varies between .3 and .45, where .3 is applied to the normal load and .45 is applied to the upset load.
25	There is a concern that there never was a procedure for the design/analysis of washer plates in the PSE group. Also NPS Class 1 supports have washer plates that are welded. Since the design rules for Class 1, 2, 3 are the same, why do only Class 1 supports require welding, and not Class 2 or 3.
26	There is a concern that the stiffness of pipe support hardware (i.e. clamps, bolts and pins, rear brackets, etc.) is not included in the pipe support stiffness when calculating the overall pipe support stiffness to be provided to Westinghouse for the Class 1 piping analysis.
27	When large structures are supported from the ceiling, the additional loading due to the y acceleration of the structure itself (i.e. structural inertia effects) should be considered. The most important consideration is the additional loadings on the baseplate and anchor bolts, which can be overlooked and which will therefore reduce the manufacturers specified maximum factor of safety.
28	There was at least two different criteria being used to determine the allowable stress for Plate and Shell type welds. One pipe support group's design guideline stated that the allowable loads can be increased for emergency and faulted conditions, while another group's guidelines did not permit any increase in allowable stress for higher loading conditions. These inconsistencies caused discrepancies between the engineer and checker.

Item #	Description of Concern
29	For an unspecified pipe support, a weld length was required by calculation to be 4 inches and this package was approved and sent to the permanent plant records vault. Later, additional loads were added and this calculation was revised and a request was made to see if a weld of 6 inches could be made. The field response was that the actual weld was only 3 inches rather than the original design of 4 inches. The concern, then, is that the as-built documentation is not consistent with the design documentation.
30	The alleger stated that Mike Chamberlain said that he qualified many supports without taking the required minimum edge distance into consideration. For example, a support baseplate that required a minimum edge distance of 1-1/4 inches based on the bolt diameter, actually had an edge distance much smaller than 1-1/4 inches. The concern is that minimum edge distance on baseplates may not have been considered properly.
31	On some Unit 1 pipe support designs the loadings listed on the drawing were different than the loadings used in the design calculations. This indicates that there was a lack of design control for the pipe support designs.
32	The allowable stress used for supports in the Containment Building (no Unit #) used allowable stress values at 200°F rather than at 285°F as required by the pipe support procedures. At least 15 examples of this condition were found by the alleger.
33	Exhibit #2 shows a weld symbol for both a two-sided and an all around weld. The concern is that the joint was welded on two sides and not all around as specified in the pipe support calculation. This should be investigated from the standpoint of the as-built program.
34	In many pipe support calculations the engineers were not deducting the two inch non-structural concrete topping when they computed the embedment depth of the particular Hilti bolts. This was required by procedure.

Item #	Description of Concern
35	At least three or four pipe support calculation packages were found where the additional forces and moments on baseplates caused by the weight of constant support hangers were not considered. This weight can sometimes be as high as 500 to 1000 pounds and can occur when the constant support hanger is welded to a structural frame.
36	When calculating the deflection of a cantilever support, the additional deflection due to the rotation of the baseplate has not been considered. This calculation is important for all Classes of supports, since stiffness calculations were required for Class 1 supports, and Class 2&3 supports had a deflection criteria.
37	There is a concern that Gibbs & Hill procedure SS-30 is not adequate for determining the allowable loads on embedded plates, since it does not agree with finite element results. An embedded plate might be approved by procedure SS-30, however, it would not be approved, if analyzed by a finite element model.
38	There is concern that the interaction formula for structural tubing in the ASME Section III and AISC Codes consider tension and bending, but do not consider shear stresses. Shear stress caused by torsion is not considered in the interaction equations. The AISI commentary by Prof. Sherman should be consulted and a determination made concerning the use of shear stress in the interaction equation.
39	There was concern that some engineers were told that they were not responsible for the original Class 5 and 6 supports designed by NPS (and possibly ITT Grinnell). They were told that they were responsible only for the field changes to these designs. However, visual inspection of several designs would determine that the designs were unstable. This situation was confusing and caused great concern.
40	There was a concern that acute weld calculations (skewed welds) were not being performed correctly by NPS. No specific concerns were given.

Item #	Description of Concern
41	There is a concern that an unstable support can result due to the lack of a resisting force, when a structural tube support design uses only 2 Richmond inserts and is subjected to a torsional load. The out-of-plane loads combine with the location of the two Richmond inserts to create a hinged condition making the support unstable.
42	The PSE guidelines for Unit 2 require a minimum size rigid strut for a certain pipe size; however, Unit 1 has no similar requirement. The PSE guidelines for Unit 1 should be reviewed to explain why no similar requirement exists for Unit 1.
43	Similar to Concern 42 the design requirement for U-bolts are different from Unit 1 to Unit 2 (number of bolts, torque, etc.). This should be investigated.
44	There is a concern that a supervisor would review finished calculations and make changes to these calculations without initialing them. These comments, then, would not go through the checking process and could be opposite in conclusion from the original calculational results. This practice violates the controls in the design process.
45	There is a concern that some of the hardware for Unit 1 support designs was not qualified in the calculation (i.e. a comparison of applied load to manufacturer's maximum allowable load was not being performed).
46	There is a concern that some washer plates are not being used with the correct thickness (refer to Item #25). Also, in many instances, washer plates were required for both sides of a particular design, however, the supports may not have always been installed with two washer plates.
47	The alleger thinks that embedded plates for Unit 2 were analyzed by Westinghouse considering all loadings from various pipe support and other groups. The concern is how were the embedded plates addressed in Unit 1, and has the Westinghouse program been properly verified. Also, was Westinghouse responsible for all of the embedded plates, or just inside containment.

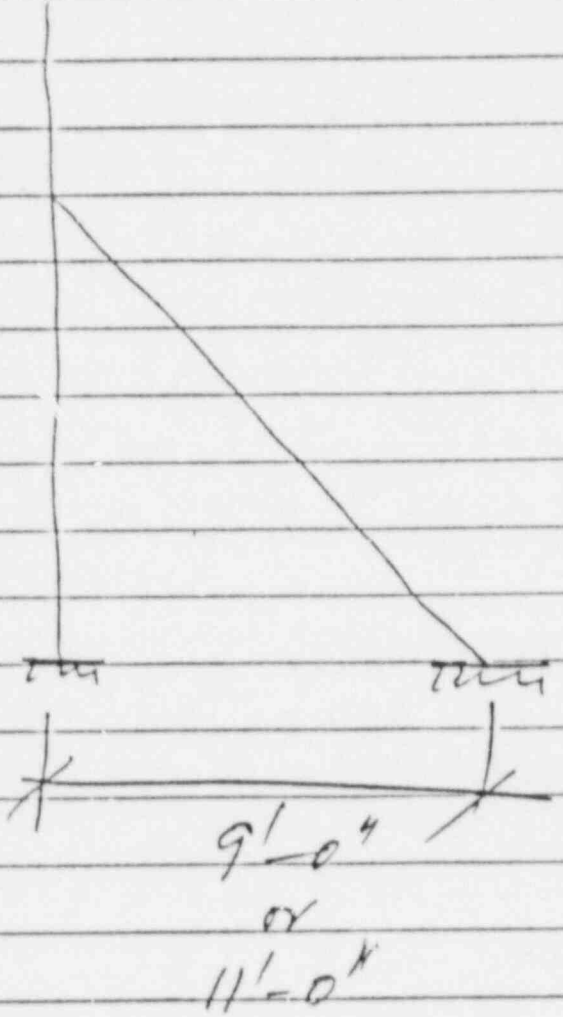
Item #	Description of Concern
48	In September 1985 numerous bugs were found by GT STRUDL personnel in the STRUDL version used by NPS in the Secaucus, New Jersey office. The effect that these bugs had on supports previously designed by NPS may not have been properly addressed. One of the supports designed using this version of the STRUDL program was a large 21 pipe gang support in Unit 1. IT is felt that this support was never designed and reviewed properly (i.e. all required loading conditions were not considered).
49	There is a concern that the two bugs in the version of GT STRUDL used by NPS that were determined to have an impact on designed structures were not corrected, and, therefore, any problems resulting from the bugs were not corrected.
50	There is a concern that the correct value of slenderness ratio, K, when rigid struts are used connected to another structural member, such as a wide flange or structural tube (see Exhibit 2). It is not sure whether the K-value was correctly considered.
51	There is a concern that, since the frequency of a long braced cantilever may be very low, a lateral acceleration value of greater than 1-G should have been used. A support in question was in the service intake structure and was part of a 100 support package submitted by John Finnerman for the ASLB hearings. The status of this support is not known, since it was taken from the alleger and given to someone else (refer to Item 22).
52	There is a concern that a painting stamp was missing on a pipe support drawing and therefore the support may not have been painted as required.
53	Thermal movements were not shown on some Unit 1 drawings where they should have been. On Unit 2, PSE maintained a computer program called HEDR which contained thermal movements and notes for all Unit 2 supports. Also, the latest support loads used in the structural calculations were not on the drawing (refer to Item 31). This reflects on the quality of the design control used for pipe supports.

Item #	Description of Concern
54	There is a concern that the latest revision of the support drawing may not always be installed in the field. When new loads were received, engineering was supposed to qualify the hardware. During the exchange of information with the field, it was determined that some of the information shown on the latest revision of the support drawing had not been implemented in the field.
55	The interaction equations used for the design of bolts in Richmond inserts was not performed separate from the design of the inserts (the same as Item # 15).
56	The Unit 1 pipe support drawings had the location plan in the lower right corner deleted from the drawing and placed on the accompanying BRHL once the revision 0 support was installed. However, Unit 2 drawings had the location plan intact. Why were these units treated differently?
57	There is a concern that consistent design criteria between the different pipe support groups performing design calculations (PSE, NPS AND ITT-G) was not required by TUGCO. (Refer to Items 8, 21, 23, 24 and 28c.)
58	There is a concern about design criteria for Hilti bolt spacings less than 10 diameters. A technical letter by John Finnerman did exist on this subject; however, the question is whether this letter has an adequate technical basis (refer to Item 17). Also, John Finnerman issued a memo or letter directing the use of a factor of safety of 4 rather than 5 for hilti bolts design for the feedwater system (why change requirements).
59	There is a concern that some design review calculations were stamped with a phrase similar to "functionally design review". However, sometimes a certification stamp was incorrectly put on these drawings which was not correct since the certification calculations had not been performed.
60	There is a concern that structural angles used in the design of Class 5 & 6 supports may not have been analyzed correctly, since they are asymmetrical sections and the calculation of their properties and principal axes is tedious. This pertains to designs by NPS.

Iter #	Description of Concern
61	There is a concern that pipe support design guidelines were changed by internal memo's issued by a group leader or supervisor and often their superiors were not on distribution. These design guidelines should have been controlled. Also, different pipe support design groups were performing calculations in a different manner.
62	In August 1985, a gang support was incorrectly shown on a computer listing as supporting 3 pipes, when actually 4 supports were attached to the gang support. A supervisor resisted making changes, therefore, the concern was management's lack of commitment to doing a thorough job.
63	No clear cut criteria for Class 5/6 supports existed. The concern is that if these supports are not correctly designed, they might fail and damage safety-related equipment.
64	Supports should be designed to some minimum loads rather than performing analysis on actual loads.
65	There is a concern over welding performed by NPS in both shop and field with particular concern over minimum weld size violations. The concern is that welds were underspecified on design drawings when compared to Table XVII-2452.1 of Appendix XVII.

SB3-2 - Unit 2, Tunnel Area, Exhibit 1

Hang Hanger



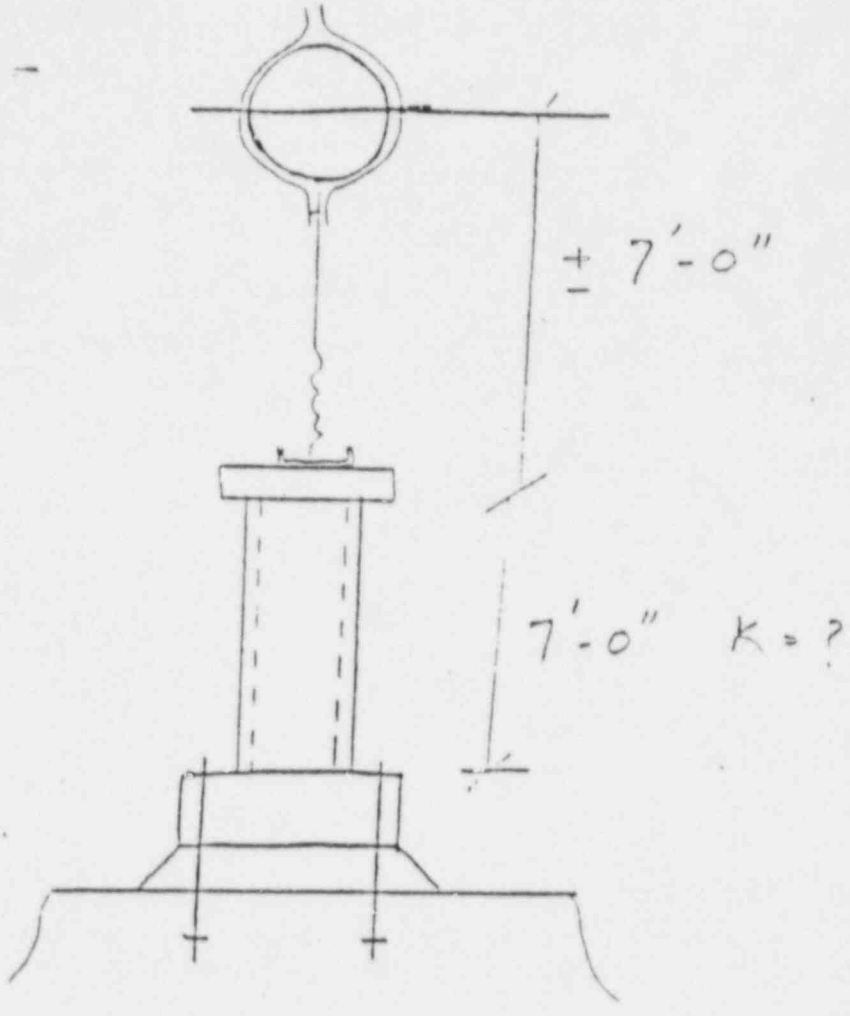


EXHIBIT 2

List of Acronyms

PSDI	Programs for Structural Design Inc.
STRUDL	Structural Design Language
DCA	Design Change Authorization
CPSES	Comanche Peak Steam Electric Station
CPRT	Comanche Peak Response Team
NPS	Nuclear Power Services
PSE	Pipe Support Engineering
ITT-G	ITT-Grinnell
AISC	American Institute of Steel Construction
ASME	American Society of Mechanical Engineers
AISI	American Iron and Steel Institute
ASLB	Atomic Safety and Licensing Board
BRHL	Brown & Root Hanger Location
TUGCO	Texas Utilities Generating Company

Enclosure 3

TU ELECTRIC

Log # TXX-6535
File # 10010

July 2, 1987

William G. Counsil
Executive Vice President

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NOS. 50-445 AND 50-446
ALLEGATIONS OF DESIGN AND CONSTRUCTION DEFICIENCIES

Gentlemen:

TU Electric has reviewed your letter from Mr. C. I. Grimes to Mr. W. G. Counsil dated May 28, 1987, pertaining to the sixty five (65) allegations of design and construction deficiencies related to CPSES Units 1 and 2. We hereby provide our assessment of these allegations in the attachment to this letter.

Per my conversation with Mr. C. I. Grimes on June 24, 1987, we were authorized an additional week in providing our response to the allegations.

Very truly yours,

W. G. Counsil

RSB/mlh
Attachment

c - Mr. R. D. Martin, Region IV
Resident Inspectors, CPSES (3)

IE54
1/1

CONCERN NO. 1

The documentation on the project has been described as "hopeless" and it is imperative that the calculations and drawings be totally reviewed, since the standard review process cannot reveal all the safety flaws.

RESOLUTION OF CONCERN

The current Stone & Webster Engineering Corporation (SWEC) requalification program for piping and supports requires a total design validation of pipe support designs, including review of the drawings and generation of new calculations. The SWEC effort was initiated in August 1985. The criteria for the review of drawings and calculations are delineated in SWEC Procedures CPPP-6, "Pipe Stress/Support Requalification Procedure - Unit No. 1," CPPP-9, "Pipe Stress/Support As-Built Procedure - Unit No. 2," and supplemented by SWEC Project Memorandum PM133, Rev. 1, "Final Reconciliation Check List." The design validation effort being performed by SWEC will review all safety-related pipe supports designed by any of the previous engineering groups.

CONCERN NO. 2

The NPS design manual should be reviewed to determine whether the provisions for punching shear are acceptable and meet specification requirements.

RESOLUTION OF CONCERN

The NPS Design Manual did contain provisions for calculating punching shear, however, this manual is not being used currently on the project. Punching shear is being addressed for all safety-related pipe supports in Unit 1 and Unit 2 as part of the total requalification effort by Stone & Webster. The design criteria for punching shear is established in SWEC Procedure CPPP-7, "Design Criteria for Pipe Stress and Pipe Supports," Attachment 4-13.

CONCERN NO. 3

The April and August 1985 versions of STRUDL were not being used correctly by the pipe support engineers. Examples are (1) slenderness ratio defaulted to K=1, unless specified as some value which most analysts omitted, and (2) local effects (web crippling, effect of holes in structural tube steel, punching shear calculations, etc.) which cannot be obtained directly from STRUDL output were not being evaluated correctly (manual calculations).

RESOLUTION OF CONCERN

The April and August 1985 versions of STRUDL to which the alleger refers are not being used by SWEC in their requalification effort. STRUDAT/SANDUL and STRUDL-SW which are being utilized by Stone & Webster in their requalification of all safety-related supports, provide no default value for slenderness ratios, therefore one must be input by the analyst. The effects of punching shear may be obtained directly from the latest version of STRUDAT/SANDUL. Direction has been provided in SWEC Procedure CPPP-7, Attachment 4-13, for the calculation of local stress.

The effect of holes in tube steel is addressed in CPPP-7, Section 4.3.2.1.

CONCERN NO. 4

There is a problem with frame SB3-2 in Unit 2 concerning STRUDL, the design was analyzed without the STRUDL being checked. There was a 24 inch discrepancy in a member length.

RESOLUTION OF CONCERN

All safety-related pipe supports (including frame SB3-2) are being requalified by Stone & Webster per SWEC Procedures CPPP-6, CPPP-9, and CPPP-7. In addition, review, checking and design verification of calculations is governed by Stone & Webster Procedure EAP 5.3, "Preparation and Control of Manual and Computerized Calculations (Nuclear Projects)."

CONCERN NO. 5

No training was given to engineers on PSDI STRUDL concerning Code check features, such as slenderness ratio. This was significant, since there were more than thirty different items that had to be checked.

RESOLUTION OF CONCERN

The Code check (ASME Code) feature of PSDI STRUDL was employed only on pipe supports. SWEC is performing a complete requalification of safety-related pipe supports per SWEC Procedures CPPP-6, CPPP-9, and CPPP-7 which includes reanalysis of STRUDL models. Training is given to SWEC design engineers on the use of STRUDL-SW, STRUDAT and SANDUL; including any revisions.

CONCERN NO. 6

There was a lack of management concern for the requirement to check and sign the STRUDL computer printout. There were examples of situations where engineers were required to sign the outputs without having checked it.

RESOLUTION OF CONCERN

All Unit 1 & 2 safety-related pipe support designs which employed STRUDL are being reanalyzed by Stone & Webster per SWEC Procedures CPPP-6, Section 7.5.2; CPPP-9, Section 7.5.1.2 and CPPP-7, Section 4.3.2. EAP 5.3 requires an independent review of each calculation including computer input and output.

CONCERN NO. 7

Embedded plates were failing using the loads from the unchecked STRUDL, and also with the loads from the revised STRUDL. This concern is connected to the concern of the large frame SB3-2.

CONCERN NO. 7 (cont'd)

RESOLUTION OF CONCERN

The embedded plate allowables which were alleged to have been exceeded were from the PSE Guidelines as determined from Specification 2323-SS-30, "Structural Embedments." This was a conservative approach using simplified methods. This allowed PSE and other departments to pre-approve attachments to embedded plates. The more precise qualification done by Civil Engineering could qualify some attachments that exceeded the allowables in the PSE Guidelines. All safety-related embedded plates (including embedded plates attached to frame SB3-2) are now being design validated by SWEC-CAP in accordance with DBD-CS-15, "The Qualification of Embedments in Concrete." The reaction loads at all connections to embedded plates are transmitted to SWEC-CAP on Structural Attachment Loading Schedule forms as required by SWEC Procedures CPPP-7, Section 4.5, CPPP-6, Section 7.5.4, CPPP-9, Section 7.5.1.4, and ECE 5.11-I4, "Reporting Attachment Loads and Locations to the Structural Embedment Group," Figure 7.1.

CONCERN NO. 8

Until August 16, 1985, different pipe support groups applied different criteria to Richmond insert design. The design consisting of Richmond inserts going through structural tubes is not a good design. It is thought that this design concept has not been tested dynamically.

RESOLUTION OF CONCERN

All safety-related pipe supports and their connections are being design validated by SWEC. In their requalification effort, SWEC has developed a standard method for qualifying Richmond inserts and associated bolts/rods. SWEC's method models a member with bolt properties in the STRUDL computer program to connect the center of the tube steel to the face of concrete. All force and moment reactions at the support joints are fixed except for the bolt's torsional moment. The force and moment reactions are first used directly in the interaction equation recommended by Robert L. Cloud Associates (RLCA) for qualifying the bolts and are later converted to tension and shear for evaluating the inserts. This interaction equation is documented by RLCA Report No. RLCA/P142/01-86/008, "Richmond Insert/Structural Tube Steel Connection, Design Interaction Equation for Bolt/Threaded Rod," Revision 0, dated September 10, 1986, and SWEC Report No. 15454.05-NZ(L)-002, "Interaction Relation for a Structural Member of Circular Cross Section," dated May 1986.

TU Electric contracted RLCA to review the Richmond insert designs and determine their appropriateness. RLCA published two reports (RLCA/P142/01-85/003, "Richmond Insert/Structural Tube Steel Connection," Revision 0, dated September 10, 1986, and RLCA/P142/01-86/008) which delineated their findings and suggestions on the use and qualification of the Richmond insert/tube steel connections. SWEC prepared their design criteria from this information.

CONCERN NO. 8 (cont'd)

RESOLUTION OF CONCERN (cont'd)

SWEC Procedure CPPP-7, Section 4.5.2 and Attachment 4-5, provides a complete design criteria for qualifying the Richmond insert/tube steel connection. All Richmond inserts and associated bolts/rods on safety-related pipe supports are properly qualified per this approved criteria.

TU Electric has performed a series of tests on Richmond inserts to develop allowable loads. The allowable loads contain a factor of safety to account for dynamic effects, therefore no dynamic tests are required.

CONCERN NO. 9

A designer was told to only use tension and shear for bolt interaction (for Richmond insert and bolt [rod] design) while other groups were also considering bolt bending. When brought to the attention of the group supervisor, he indicated that the bolt design should be performed as directed (No specific design).

RESOLUTION OF CONCERN

In their requalification of all safety-related pipe supports, SWEC has developed a standard method for qualifying Richmond inserts and associated bolts/rods. SWEC's method models a member with bolt properties in the STRUDL computer program to connect the center of the tube steel to the face of concrete. All force and moment reactions at the support joints are fixed except for the bolt's torsional moment. The force and moment reactions are first used directly in the interaction equation recommended by RLCA for qualifying the bolts and are later converted to tension and shear for evaluating the inserts. This interaction equation is documented by RLCA Report No. RLCA/P142/01-86/008, and SWEC Report No. 15454.05-NZ(L)-002.

SWEC Procedure CPPP-7, Section 4.5.2 and Attachment 4-5, assures that the Richmond inserts and associated bolts/rods are properly qualified for all applicable pipe support designs.

All safety-related pipe supports will be requalified to the CPPP-7 criteria for bolts/rods. These criteria have been reviewed and verified.

CONCERN NO. 10

A DCA exists that allows the designer to use far higher allowable loads for Richmond inserts for emergency conditions than for normal condition (No specific design).

RESOLUTION OF CONCERN

SWEC has established Richmond insert allowable loads based on the average failure value of Richmond insert specimens as reported in the April 19, 1984, TU Electric Test Report, and a safety factor of 3 for normal, upset and emergency conditions, and a safety factor of 2 for faulted condition.

CONCERN NO. 10 (cont'd)

RESOLUTION OF CONCERN (cont'd)

In addition, SWEC-PSE adjusted the allowables downward based on the differences in strength between concrete used in the tests and the minimum design strength of concrete in the plant.

SWEC Procedure CPPP-7, Attachment 4-5, delineates the allowable loads for Richmond inserts to be used for pipe supports. All Richmond inserts employed in safety-related pipe supports are being analyzed and reviewed for compliance with the new allowables.

CONCERN NO. 11

There is a concern that the boundary conditions between the Richmond insert and the concrete surface (i.e. fully or partially fixed) have not been satisfactorily established (No specific design).

RESOLUTION OF CONCERN

As part of the requalification of all safety-related pipe supports, SWEC has established the tube steel to bolt load transfer mechanism for shear and torsion loads (with respect to the tube steel), and has developed a conservative design methodology for evaluating these connections. This methodology is supported by an independent review documented in RLCA Report No. RLCA/P142/01-85/003.

SWEC Procedure CPPP-7, Attachment 4-5, delineates the methodology for evaluating these connections. All Richmond inserts employed in safety-related pipe supports are being analyzed and reviewed using this new methodology.

CONCERN NO. 12

Richmond insert testing currently being done is too limited, since interactions on the Richmond insert rods may be as high as .8. Full scale testing on site should be performed or accurate experimental work done at various university laboratories.

RESOLUTION OF CONCERN

SWEC has reviewed TU Electric's test procedures and found them in accordance with ASTM Standard E488-76. These tests comply with regulatory requirements and were extensive enough to draw the required conclusions.

SWEC established the Richmond insert allowable loads based on the average failure of Richmond insert test specimens as reported in the April 19, 1984, TU Electric Test Report, and a safety factor of 3 for normal, upset and emergency conditions, and a safety factor of 2 for faulted condition.

CONCERN NO. 12 (cont'd)

RESOLUTION OF CONCERN (cont'd)

SWEC Procedure CPPP-7, Attachment 4-5, delineates the allowable loads for Richmond inserts for pipe supports. All Richmond inserts employed in safety-related pipe supports are being qualified to these new allowable loads.

Allowables for Richmond insert rods were developed by SWEC based on conservative elastic properties of the material. The interaction equation recommended by RLCA for qualifying the rods conservatively considers all loads acting on the bolt and thus negates the need for additional testing. Interactions on the Richmond insert rods may be as high as 0.8 in some cases, but are less than the allowable interaction value of 1.0.

CONCERN NO. 13

Alleger states that his real problem is not Richmond inserts per se, but rather with their use in non standard connections like tube steel rather than baseplates.

RESOLUTION OF CONCERN

It is somewhat unclear what the alleger means by "non-standard connections." TU Electric contracted RLCA to review the Richmond insert designs and determine their compliance with regulatory requirements and sound engineering principles. RLCA published two reports (RLCA/P142/01-85/003 and RLCA/P142/01-86/008) which delineated their findings and suggestions on the use and qualification of the Richmond insert/tube steel connections. SWEC prepared their design criteria from this information.

SWEC Procedure CPPP-7, Attachment 4-5, provides a complete design criteria for qualifying the Richmond insert/tube steel connection. All Richmond inserts employed in safety-related pipe supports are being analyzed and reviewed using this new criteria.

CONCERN NO. 14

A higher allowable load was used for Richmond inserts and the associated rods under emergency loadings during 1983 or 1984. This approach is not correct and should be investigated (No specific design).

RESOLUTION OF CONCERN

SWEC established the Richmond insert allowable loads based on the average failure value of Richmond insert test specimens as reported in the April 19, 1984, TU Electric Test Report, and a safety factor of 3 for normal, upset and emergency conditions, and a safety factor of 2 for faulted condition. SWEC-PSE adjusted the allowables downward based on the differences in the concrete strengths used in the tests and the minimum design strength in the plant.

CONCERN NO. 14 (cont'd)

RESOLUTION OF CONCERN (cont'd)

SWEC Procedure CPPP-7, Attachment 4-5, delineates the allowable loads for Richmond inserts and bolts/rods for pipe supports. The allowable loads for the bolts/rods may be increased by a factor of 1.33 per SWEC Procedure CPPP-7, Attachment 4-5, Section 1.2. All Richmond inserts and associated bolts/rods on safety-related pipe supports are being design validated to the current allowables. These allowables are based on valid tests which provide the most meaningful values.

CONCERN NO. 15

A review of the calculations for Richmond inserts indicated that on numerous occasions the Richmond insert spacing was not properly considered while applying the allowable loads. Since the spacing requirements for Richmond inserts is defined in the design specification, this indicates that the procedures were not being followed (No specific design).

RESOLUTION OF CONCERN

In their requalification effort, SWEC is considering spacing of Richmond inserts to determine allowable loads. When minimum required spacing is not present, allowable loads are decreased.

As part of the design validation, all Richmond inserts on safety-related pipe supports are being reinspected for spacing requirements. SWEC Procedure CPPP-7, Attachment 4-5, assures that the proper allowables for specified spacings will be used to qualify Richmond inserts.

CONCERN NO. 16

The allowable loads for Richmond inserts and the associated rods are different due to material and testing considerations. However, the Richmond insert allowable was often incorrectly used for the rods (No specific design).

RESOLUTION OF CONCERN

Procedures require that all pipe support calculations, after being completed by an engineer, are reviewed for completeness and accuracy. Included in this review is a determination that the correct allowables are used.

The correct allowables for both Richmond inserts and bolt/rod materials are given in SWEC Procedure CPPP-7, Attachment 4-5. Also, as part of the review process of each pipe support calculation, the reviewer must complete a checklist (CPPP-6, Attachment 9-10 and CPPP-9, Attachment 9-9). This checklist specifically addresses the evaluation of Richmond inserts and associated bolts/rods to assure that these attributes were correctly addressed. All Richmond inserts and bolts/rods on safety-related pipe supports are design validated by SWEC to assure proper allowables are used.

CONCERN NO. 17

There is a question as to the validity of the use of specified allowable loads for the spacing of adjacent Hilti bolts when the spacing is less than 10 bolt diameters. This should be investigated (No specific design).

RESOLUTION OF CONCERN

PSE Guidelines, Section V, Paragraph 2.3, originally addressed Hilti bolt allowables for spacing less than 10 diameters. Specification 2323-SS-30 also addressed this issue. In their requalification effort, SWEC is evaluating all bolt spacings of less than 10 bolt diameters on safety-related installations. The procedure is established in SWEC Procedure CPPP-7, Section 4.5.3 and Attachment 4-4 for pipe supports.

The allowables now in use are in compliance with regulatory requirements. Therefore, all Hilti bolts utilized on safety-related pipe supports with spacing less than 10 diameters are analyzed for their specific loads and either found acceptable, modified or replaced.

CONCERN NO. 18

There is a question as to the allowable loads that should be used for the design of Hilti bolts when they are located near equipment that vibrates. If a higher factor of safety is to be used, the basis for this allowable load should be explained (No specific design).

RESOLUTION OF CONCERN

Concrete expansion bolts (such as Hilti) subjected to vibration (cyclic loads) as well as seismic loads were addressed by the NRC in 1979 in IE Bulletin No. 79-02. This bulletin was issued to all Power Reactor Facilities with an operating license or construction permit (including Comanche Peak). Ultimate bolt capacities were to be reduced by a factor of safety of four for wedge and sleeve type anchor bolts. To address cyclic loads, Comanche Peak used a factor of safety of five in previous designs. The NRC Staff found the TU Electric's design methods in this area acceptable.

An independent study was issued by Teledyne Engineering Services. Teledyne Report No. 3051-1, Rev. 1, "Generic Response to USNRC IE Bulletin 79-02, Base Plate/Concrete Expansion Anchor Bolts," dated August 30, 1979, concludes that cyclic loading has no impact on bolt capacity.

The Utility and SWEC agree with this conclusion and therefore have established a factor of safety equal to four against ultimate failure. All safety-related pipe supports are requalified by SWEC Procedure CPPP-7 and have used a minimum factor of safety of 4; therefore, the effect of vibration on Hilti bolt allowables has been addressed implicitly and all safety-related designs are being validated with this criteria.

CONCERN NO. 19

There is a concern that minimum size baseplates should be used on the CPSES project. Other projects have a 3/4" minimum plate thickness by specification. There are some large structural frames at Comanche Peak that have baseplates as thin as 3/8", which can cause warpage in the baseplate due to welding (No specific design).

RESOLUTION OF CONCERN

Brown & Root QC procedures require the reporting to the Engineer via a Non-Conformance Report of all welding distortion discovered during the reinspection of safety-related pipe supports. Reference Procedures QI-QAP-11.1-28, "Fabrication and Installation Inspection of Safety Class Component Supports," and CP-QAP-12.1, "Mechanical Component Installation Verification." These reinspections are part of the Hardware Validation Program (HVP) and Supplemental Inspection Checklist (SIC) program and cover all safety-related pipe supports. Significant warpage or distortion would be found by this program also. Therefore, any significant warpage will be identified and a redesign or modification will be made when required.

CONCERN NO. 20

A question has been raised concerning the design/structural adequacy of a support structure contained in a remodification package of about 100 supports selected by the CPRT. The sketch is shown as Exhibit No. 1.

RESOLUTION OF CONCERN

The sketch in Exhibit 1 does not portray SB3-2 (as noted on the Exhibit) but appears to portray support SW-1-031-009-J05R. Support SB3-2 is currently being design validated by SWEC. Support SW-1-031-009-J05R has been requalified by SWEC in accordance with CPPP-7 and found acceptable with no modifications.

CONCERN NO. 21

There is a concern that different allowable pipe anchor deflections exists for the various pipe support groups. One group uses .005" while another group uses .03" or 1/16 of an inch. The allowable pipe anchor deflection should be governed by the appropriate procedures.

RESOLUTION OF CONCERN

All ASME pipe stress analyses are being requalified using either generic stiffness where applicable or actual stiffness according to rules contained in CPPP-7. The unified criteria was developed by SWEC to address all aspects of the stiffness (deflection under load) concerns.

SWEC Procedure CPPP-7, Section 4.3.2.2, Attachment 4-18 and Tables 3.10.8-1 through 3.10.8-3, assures that all pipe support and anchor stiffnesses are acceptable and controlled by project procedure.

CONCERN NO. 22

There is a concern that the frequency of the sketch shown in Exhibit 1 is inadequate, since the frequency is relatively low, only 7 or 8 Hz (in the unrestrained direction). Also at one time there was a mandatory requirement that each support should have a frequency of at least 20Hz. This was removed from the criteria when many supports were not meeting this requirement (refer to Item 20).

RESOLUTION OF CONCERN

In their requalification effort, SWEC is considering the effect of frequency and seismic excitation of pipe support mass on the design of safety-related supports. Control of this design parameter is contained in SWEC Procedure CPPP-7, Section 4.3.4.4 and Attachment 4-21. Support stiffness effects (frequency is dependent on mass and stiffness) have been addressed in CPPP-7. (See concern 21).

CONCERN NO. 23

There is a concern that if supports did not meet the appropriate design criteria using the NPS design specification, the supports were sent to another pipe support design group, such as PSE, and would be considered acceptable using different design criteria. This condition indicates that different design criteria was used in the various pipe support design groups (NPS, ITT-G and PSE). (Criteria may be different for Richmond insert loads).

RESOLUTION OF CONCERN

Project Management has replaced the three previous design organizations with SWEC who has developed a single set of criteria to be applied consistently to support analysis and design. All safety-related pipe supports are now being validated to this single set of criteria. This set of criteria is contained in SWEC Procedure CPPP-7. Criteria for Richmond insert loads is contained in CPPP-7, Section 4.5.2 and Attachment 4-5.

CONCERN NO. 24

There is a concern that the value of the coefficient of friction and the method for determining the normal condition load is different among the various pipe support design groups. Again this indicates different groups using different criteria (See concern 23 above). For example, the values of the friction coefficient used on the project varies between .3 and .45, where .3 is applied to the normal load and .45 is applied to the upset load.

RESOLUTION OF CONCERN

In their requalification of all safety-related pipe supports, SWEC is considering the effect of friction on all sliding surfaces. A coefficient of friction of 0.3 is applied to all applicable loads (which are added algebraically) to determine the total load due to friction. SWEC Procedure CPPP-7, Section 4.7.3 and Attachment 4-7, assures that friction loads are properly considered in all applicable pipe support designs.

CONCERN NO. 25

There is a concern that there never was a procedure for the design/analysis of washer plates in the PSE group. Also NPS Class 1 supports have washer plates that are welded. Since the design rules for Class 1, 2, 3 are the same, why do only Class 1 supports require welding, and not Class 2 or 3.

RESOLUTION OF CONCERN

In their requalification of all safety-related pipe supports, SWEC has developed a method of evaluating the necessity for or adequacy of washer plates and their welds. Using the tube steel thickness/washer plate thickness, an allowable load is determined from Tables in SWEC Procedure CPPP-7. The allowable load is then corrected for temperature and load condition and compared to the actual load.

SWEC Procedure CPPP-7, Attachment 4-13, assures that the washer plates are adequately sized. The design requirements for Class 1 supports do not differ from Class 2 or 3 supports for washer plates.

CONCERN NO. 26

There is a concern that the stiffness of pipe support hardware (i.e., clamps, bolts and pins, rear brackets, etc.) is not included in the pipe support stiffness when calculating the overall pipe support stiffness to be provided to Westinghouse for the Class 1 piping analysis.

RESOLUTION OF CONCERN

Stiffness values for all pipe supports on Class 1 stress problems were recalculated by SWEC in a consistent and controlled manner. These revised stiffnesses were supplied to Westinghouse, and all Class 1 stress problems have been requalified.

SWEC has developed a comprehensive procedure for calculating stiffness values (CPPP-7, Section 4.3.2.2 and Attachment 4-18) to assure that pipe support stiffness is always considered in a proper manner.

CONCERN NO. 27

When large structures are supported from the ceiling, the additional loading due to the acceleration of the structure itself (i.e., structural inertia effects) should be considered. The most important consideration is the additional loadings on the baseplate and anchor bolts, which can be overlooked and which will therefore reduce the manufacturers specified maximum factor of safety.

CONCERN NO. 27 (cont'd)

RESOLUTION OF CONCERN

In their requalification of all safety-related pipe supports, SWEC is evaluating seismic acceleration of pipe support mass per SWEC Procedure CPPP-7, Section 4.3.4.4 and Attachment 4-21. Anchor bolts will be qualified in accordance with CPPP-7, Section 4.5 and Attachments 4-4 and 4-5, and include the effects of seismic self-weight excitation.

CONCERN NO. 28

There was at least two different criteria being used to determine the allowable stress for Plate and Shell type welds. One pipe support group's design guideline stated that the allowable loads can be increased for emergency and faulted conditions, while another group's guidelines did not permit any increase in allowable stress for higher loading conditions. These inconsistencies caused discrepancies between the engineer and checker.

RESOLUTION OF CONCERN

As indicated in Concern No. 23, since August of 1985, SWEC is responsible for requalifying all safety-related pipe supports at CPSES, replacing the three previous organizations, and utilizing a single set of design criteria, namely SWEC Procedure CPPP-7. Weld design is properly addressed in Attachment 4-2 to CPPP-7. With regard to the allowable stress for plate and shell type welds, the ASME Code Subsection NF provided no direction concerning increased allowables until the issuance of the 1986 Edition in which the code was clarified to indicate that increased allowables for plate and shell welds are appropriate, as indicated in Subsection NF-3226.2 (b).

CONCERN NO. 29

For an unspecified pipe support, a weld length was required by calculation to be 4 inches and this package was approved and sent to the permanent plant records vault. Later, additional loads were added and this calculation was revised and a request was made to see if a weld of 6 inches could be made. The field response was that the actual weld was only 3 inches rather than the original design of 4 inches. The concern, then, is that the as-built documentation is not consistent with the design documentation.

RESOLUTION OF CONCERN

In the Quality of Construction (QOC) part of the CPRT Program, welding on pipe supports was sampled and reinspected. There were no findings to indicate a generic problem regarding weld length from the ERC reinspection. Nevertheless, as part of the Hardware Validation Program (HVP) and the Supplementary Inspection Checklist (SIC), weld configurations are being confirmed on all safety-related pipe supports. All previously inspected and vaulted packages are being reinspected.

CONCERN NO. 30

The alleger stated that Mike Chamberlain said that he qualified many supports without taking the required minimum edge distance into consideration. For example, a support baseplate that required a minimum edge distance of 1-1/4 inches based on the bolt diameter, actually had an edge distance much smaller than 1-1/4 inches. The concern is that minimum edge distance on baseplates may not have been considered properly.

RESOLUTION OF CONCERN

Minimum edge distance for baseplates on ASME supports is defined in the ASME Code, Section III, Appendix XVII-2462, 1980 Edition, which was adopted by the project in 1982. SWEC Procedure CPPP-7, Table 4.5.1-1, contains specific criteria for minimum edge distance which is in accordance with the ASME Code. All safety-related pipe supports are being requalified to the SWEC criteria. Nevertheless, the required minimum edge distance will be verified for all safety-related pipe supports during reinspections currently being conducted in the project Hardware Validation Program (HVP) and Supplemental Inspection Checklist (SIC) programs.

CONCERN NO. 31

On some Unit 1 pipe support designs, the loadings shown on the drawing were different than the loadings used in the design calculations. This indicates that there was a lack of design control for the pipe support designs.

RESOLUTION OF CONCERN

In the SWEC requalification program, all safety-related pipe supports are designed and/or qualified to the loads from the latest stress analysis. Loads are recorded in the stress analysis packages and the pipe support calculation packages. In accordance with our procedures, only spring type supports (constant and variable) will have loads shown on the face of the drawing.

SWEC Project Memorandum 121, Rev. 2, "Loads and Movements Required to be Shown on Pipe Support Drawings," provides the controls to the stress analysis and pipe support organizations to assure proper design control of pipe support loads.

CONCERN NO. 32

The allowable stress used for supports in the Containment Building (no Unit #) used allowable stress values at 200°F rather than at 285°F as required by the pipe support procedures. At least 15 examples of this condition were found by the alleger.

CONCERN NO. 32 (cont'd)

RESOLUTION OF CONCERN

It has always been design policy to reduce allowables in the Unit 1 and Unit 2 Containment Buildings to account for increased temperature. Refer to PSE Guidelines Section III, Rev. 3, dated 3/23/82 and NPS Guidelines Section 1, Rev. 2, dated 7/28/83.

All safety-related pipe supports in the Containment Buildings are being reanalyzed by Stone & Webster using the allowable stress values for material at 300°F (This is more conservative than the values @ 285°F given by the alleger). SWEC Procedure CPPP-7, Table 4.7.2-8, contains this guidance.

CONCERN NO. 33

Exhibit #2 shows a weld symbol for both a two-sided and an all around weld. The concern is that the joint was welded on two sides and not all around as specified in the pipe support calculation. This should be investigated from the standpoint of the as-built program.

RESOLUTION OF CONCERN

Exhibit #2 does not show a weld symbol; however, we will address the general concern of weld configuration. In the ERC reinspections conducted as part of the QOC portion of CPRT, some isolated instances of missing welds were identified. The cases were isolated and the evaluations of those cases did not lead to any recommended corrective action by ERC. In any event, as part of the HVP and SIC reinspections being performed on all safety-related pipe supports, weld configuration is being confirmed. Thus any conditions which do not conform to the original design are being identified and corrected.

CONCERN NO. 34

In many pipe support calculations the engineers were not deducting the two inch non-structural concrete topping when they computed the embedment depth of the particular Hilti bolts. This was required by procedure.

RESOLUTION OF CONCERN

In their requalification of all safety-related pipe supports, SWEC has specifically targeted this issue. In SWEC Procedure CPPP-7, Section 4.5.3, engineers are required to reduce effective embedment by 2" in the floor areas of concern. Calculation No. 15454 NZ(C)-GNX-081 lists the applicable building, elevation, and structural drawings that require this adjustment.

CONCERN NO. 35

At least 3 or 4 pipe support calculation packages were found where the additional forces and moments on baseplates caused by the weight of constant support hangers were not considered. This weight can sometimes be as high as 500 to 1000 pounds and can occur when the constant support hanger is welded to a structural frame.

RESOLUTION OF CONCERN

In their requalification of all safety-related pipe supports, SWEC is evaluating the effect of all components attached to structural frames or back-up structures in accordance with SWEC Procedure CPPP-7, Section 4.3.

CONCERN NO. 36

When calculating the deflection of a cantilever support, the additional deflection due to the rotations of the baseplate has not been considered. This calculation is important for all Classes of supports, since stiffness calculations were required for Class 1 supports, and Class 2 & 3 supports had a deflection criteria.

RESOLUTION OF CONCERN

Prior to the SWEC requalification effort, the PSE Design Guidelines contained specific instructions for calculating support deflections due to rotation at the baseplate. It was standard practice for the PSE Group and NPSI Group to consider baseplate rotation in their deflection and stiffness calculations for cantilever type supports.

In their requalification effort, SWEC is considering the effect of baseplate rotation in their stiffness assessment for all safety-related pipe supports. These guidelines are delineated in SWEC Procedure CPPP-7, Attachment 4-18.

CONCERN NO. 37

There is a concern that Specification 2323-SS-30 is not adequate for determining the allowable loads on embedded plates, since it does not agree with finite element results. An embedded plate might be approved by Specification 2323-SS-30, however, it would not be approved, if analyzed by a finite element model.

RESOLUTION OF CONCERN

Detailed finite element analysis of specific configurations generally yields different (more refined) results than generic analysis. Specification 2323-SS-30 was a generic approach to embedded plate qualification. There is no record of any support that was qualified by Specification 2323-SS-30 and was not subsequently approved by a proper finite element model. Prior to requalification of embedded plates by SWEC CAP, the WEB Group (engineers responsible for qualification of all embedded strip plates) had responsibility for complete field verification and engineering qualification (by Westinghouse analysis). Any supports that were not approved by the WEB Group would have been returned to the responsible department for required modifications.

CONCERN NO. 37 (cont'd)

RESOLUTION OF CONCERN (cont'd)

The pre-qualification of embedded plates by SWEC PSE is no longer utilized. The methodology based on Specification 2323-SS-30 has been deleted. All safety-related embedded plates are being reanalyzed by SWEC-CAP using the final "Foot Print Loads". For procedures see SWEC Procedures CPPP-7, Section 4.5; CPPP-6, Section 7.5.4; CPPP-9, Section 7.5.1.4 and ECE 5.11-I4.

CONCERN NO. 38

The alleger is concerned that the interaction formula for structural tubing in the ASME Section III and AISC Codes considers tension and bending, but does not consider shear stresses. Shear stress caused by torsion is not considered in the interaction equations. The AISI commentary by Prof. Sherman should be consulted and a determination made concerning the use of shear stress in the interaction equation.

RESOLUTION OF CONCERN

ASME/AISC Codes do not consider shear stress in interaction equations for structural tubing. Conversations with AISI offices have confirmed that Professor Sherman has never contributed to their commentary. The utility has committed to comply with applicable codes (ASME, AISC) as stated in the FSAR. CPPP-7, Table 4.7.2-4, provides a conservative check for shear stress which satisfies code requirements. This check negates the need to include shear stress in an interaction equation.

CONCERN NO. 39

There was concern that some engineers were told that they were not responsible for the original Class 5 and 6 supports designed by NPS (and possibly ITT Grinnell). They were told that they were responsible only for the field changes to these designs. However, visual inspection of several designs would determine that the designs were unstable. This situation was confusing and caused great concern.

RESOLUTION OF CONCERN

All seismic supports are being reviewed, and modified if necessary, to assure that the support cannot shift or move to an unqualified position. Class 5 and 6 supports within ASME stress problem boundaries are being qualified in accordance with SWEC Procedure CPPP-7. Other seismic Category II, Class 5 and 6 supports are being reviewed in accordance with SWEC Procedure CPPP-30, "Validation of Seismic Category II Large Bore Piping and Support Designs." TU Electric is implementing appropriate configuration management and design control to assure that stable support configurations are maintained.

CONCERN NO. 40

There was a concern that acute weld calculations (skewed welds) were not being performed correctly by NPS. No specific concerns were given.

RESOLUTION OF CONCERN

All skewed welds (acute and obtuse) on safety-related pipe supports are being reviewed under the Stone & Webster requalification program. Skewed weld analyses are being performed in accordance with SWEC Procedure CPPP-7, Attachment 4-2.

CONCERN NO. 41

There is concern that an unstable support can result due to the lack of a resisting force, when a structural tube support design uses only 2 Richmond inserts and is subjected to a torsional load. The out-of-plane loads combine with the location of the two Richmond inserts to create a hinged condition making the support unstable.

RESOLUTION OF CONCERN

All safety-related single tube steel members subjected to torsion from primary loads are being modified to have outriggers installed at the Richmond insert connection to distribute the moment. The required hardware modifications are justified in SWEC Calculation No. 15454-NZ(S)-G1.

SWEC Project Procedure CPPP-7, Attachment 4-5, delineates the procedure for qualifying Richmond inserts and associated bolts/rods for this type of connection.

CONCERN NO. 42

The PSE guidelines for Unit 2 require a minimum size rigid strut for a certain pipe size; however, Unit 1 has no similar requirement. The PSE Guidelines for Unit 1 should be reviewed to explain why no similar requirement exists for Unit 1.

RESOLUTION OF CONCERN

The guidelines for minimum size rigid strut were added in response to stiffness concerns, not load carrying capabilities. In the SWEC requalification program, support stiffnesses for safety-related pipe supports are being properly accounted for regardless of strut size to assure appropriate stiffnesses are utilized in piping analysis. These processes are contained in SWEC Procedure CPPP-7, Section 4.3.2.2, and Attachment 4-18. This procedure is used consistently for Units 1 and 2.

CONCERN NO. 43

Similar to Concern 42 the design requirement for U-bolts are different from Unit 1 to Unit 2 (number of bolts, torque, etc.). This should be investigated.

RESOLUTION OF CONCERN

The SWEC requalification program addresses U-bolt supports for safety-related applications in CPPP-7, Section 4.2.5 and Attachment 4-3. The procedure is being consistently applied to both Units 1 and 2. Cinched U-bolts are no longer used on safety-related seismic pipe supports in either unit.

CONCERN NO. 44

There is a concern that a supervisor would review finished calculations and make changes to these calculations without initialing them. These comments, then, would not go through the checking process and could be opposite in conclusion from the original calculational results. This practice violates the controls in the design process.

RESOLUTION OF CONCERN

Currently all design calculations for safety-related pipe supports are being validated by SWEC. It is not an acceptable practice to alter a previously reviewed calculation without entering the amendments back through the original review process. The review of calculations is controlled by Stone & Webster Procedure EAP-5.3.

CONCERN NO. 45

There is a concern that some of the hardware for Unit 1 support designs was not qualified in the calculation (i.e., a comparison of applied load to manufacturer's maximum allowable load was not being performed).

RESOLUTION OF CONCERN

The previous on-site ITT and NPSI design change review groups had reviewed only field changes to support designs. If no change had occurred relative to any of the support components, and the support load had not changed, it was not necessary to re-qualify those components since they were qualified (comparison of applied load to manufacturers' allowables) in the ITT or NPSI home office in the original design calculation.

In the SWEC requalification program, support components are being totally requalified and no credit is being taken for any previous ITT or NPSI calculations. Technical guidance is provided in SWEC Procedure CPPP-7.

CONCERN NO. 46

There is a concern that some washer plates are not being used with the correct thickness (refer to Item #25). Also, in many instances, washer plates were required for both sides of a particular design, however, the supports may not have always been installed with two washer plates.

RESOLUTION OF CONCERN

The HVP and SIC reinspection programs represent a walkdown of safety-related pipe supports to assure that attributes are in conformance with the component specifications and drawings. The HVP and SIC are applicable to Unit 1 and Common Only.

The inspection attributes of the HVP and SIC are incorporated into Procedure CP-QAP-12.1 and this procedure will be used for inspection of the Unit 2 supports during the N-5 walkdown.

As part of these walkdowns, washer plates will be verified to be in accordance with the drawings.

CONCERN NO. 47

The alleger thinks that embedded plates for Unit 2 were analyzed by Westinghouse considering all loadings from various pipe support and other groups. The concern is how were the embedded plates addressed in Unit 1, and has the Westinghouse program been properly verified. Also, was Westinghouse responsible for all of the embedded plates, or just inside containment.

RESOLUTION OF CONCERN

Westinghouse was responsible for all embedded plates except inside Unit 1 Containment. Qualification of embedded plates inside Unit 1 Containment was an open item prior to 1986.

All Safety-related embedded plates became the responsibility of SWEC-CAP in 1986. In their requalification effort, SWEC-PSE transmits footprint loads in accordance with SWEC Procedures CPPP-7, Section 4.5; CPPP-6, Section 7.5.4 and CPPP-9, Section 7.5.1.4. SWEC-CAP will qualify safety-related embedded plates in accordance with ECE 5.11-I4 and DBD-CS-15. This is applicable to both units.

CONCERN NO. 48

In September 1985 numerous bugs were found by GT STRUDL personnel in the STRUDL version used by NPS in the Secaucus, New Jersey office. The effect that these bugs had on supports previously designed by NPS may not have been properly addressed. One of the supports designed using this version of the STRUDL program was a large 21 pipe gang support in Unit 1. It is felt that this support was never designed and reviewed properly (i.e., all required loading conditions were not considered).

CONCERN NO. 48 (cont'd)

RESOLUTION OF CONCERN

All safety-related pipe supports which require a STRUDL analysis are now being analyzed using STRUDL-SW in the SWEC requalification effort. GT STRUDL is not being utilized by Stone & Webster in their requalification of pipe supports. STRUDL-SW is a verified and benchmarked program. SWEC has proper controls for computer programs in place to assure that identified bugs are corrected and proper backfits are performed.

CONCERN NO. 49

There is a concern that the two bugs in the version of GT STRUDL used by NPS were determined to have an impact on designed structures which were not corrected, and, therefore, any problems resulting from the bugs were not corrected.

RESOLUTION OF CONCERN

All safety-related pipe supports which require a STRUDL analysis are now being analyzed using STRUDL-SW in the SWEC requalification effort. GT STRUDL is not being utilized by Stone & Webster in their requalification of pipe supports. STRUDL-SW is a verified and benchmarked program. SWEC has proper controls for computer programs in place to assure that identified bugs are corrected and proper backfits are performed.

CONCERN NO. 50

There is a concern that the correct value of slenderness ratio, K, when rigid struts are used connected to another structural member, such as a wide flange or structural tube (see Exhibit 2). It is not sure whether the K-value was correctly considered.

RESOLUTION OF CONCERN

In their requalification effort, SWEC is properly calculating slenderness ratio for these strut/structure type supports, in accordance with project Procedure CPPP-7, Section 4.2.4, and Attachment 4-9. These guidelines satisfy the requirements of the AISC Code, Section 1.8.4.

CONCERN NO. 51

There is a concern that, since the frequency of a long braced cantilever may be very low, a lateral acceleration value of greater than 1-G should have been used. A support in question was in the service intake structure and was part of a 100 support package submitted by John Finneran for the ASLB hearings. The status of this support is not known, since it was taken from the alleger and given to someone else (refer to Item 22).

CONCERN NO. 51 (cont'd)

RESOLUTION OF CONCERN

For generic resolution, see Concern No. 22 for discussion. For the specific support, which we believe to be SW-1-031-009-J05R, calculations were completed in June, 1985, with proper consideration given to the acceleration value used in the seismic self-weight excitation calculations. The support has been requalified by SWEC in accordance with SWEC piping and support requalification Procedure CPPP-7 and was acceptable without modification.

CONCERN NO. 52

There is a concern that a standard note for the painting of a pipe support was not included on a drawing, and therefore the support may not have been painted as required.

RESOLUTION OF CONCERN

On DCA 2979 dated 11/15/78, the painting procedure for pipe supports was directed. This DCA was written against Specifications 2323-AS-30, "Painting" and 2323-AS-31, "Protective Coatings" and required painting of all steel structures.

Omission of painting requirements from a pipe support drawing will not cause painting to be neglected. All pipe supports inside Containment must be painted. For requirements, see Specification 2323-AS-31, Sections 1.1.b and 1.1.c.9. All pipe supports outside of Containment must be painted. For requirements, see Specification 2323-AS-30, Sections 1.0.b, 1.1.b, 1.1.d, 7.0, 9.1.c and 11.3.

CONCERN NO. 53

Thermal movements were not shown on some Unit 1 drawings where they should have been. On Unit 2, PSE maintained a computer program called HEDR which contained thermal movements and notes for all Unit 2 supports. Also, the latest support loads used in the structural calculations were not on the drawing (refer to Item 31). This reflects on the quality of the design control used for pipe supports.

RESOLUTION OF CONCERN

Thermal movements from the latest stress analysis are used in the requalification of safety-related pipe supports for Units 1 and 2. These movements are recorded in the stress analysis packages and the pipe support calculation packages. Spring type supports (constant and variable) and snubbers will have thermal movements (regardless of value) shown on the face of the drawing.

CONCERN NO. 53 (cont'd)

RESOLUTION OF CONCERN (cont'd)

In the SWEC requalification effort, SWEC Project Memorandum 121, Rev. 2, provides the controls to the stress analysis and pipe support organizations to assure proper design control of piping thermal movements.

CONCERN NO. 54

There is a concern that the latest revision of the support drawing may not always be installed in the field. When new loads were received, engineering was supposed to qualify the hardware. During the exchange of information with the field, it was determined that some of the information shown on the latest revision of the support drawing had not been implemented in the field.

RESOLUTION OF CONCERN

System N-5's were prepared in 1983 and 1984, and the N-3 for Unit 1 was signed in October, 1984. This signified that the as-installed condition of the piping and supports was in accordance with the latest design drawings. We are not aware of any condition, where construction work was complete, that a support was not installed to the latest revision of the drawing.

To provide assurance that all safety-related pipe supports are installed to the latest design requirements, TU Electric has implemented two programs. The first, the Hardware Validation Program (HVP), assures that all hardware related attributes are correct. This includes, but is not limited to, strut/snubber/ spring size and type, cotter pins, jam nuts, locking devices, etc. The second, the Supplemental Inspection Checklist (SIC), assures that non-hardware related attributes, such as working point dimensions, are correct. Also, a comprehensive configuration management program implemented by TU Electric assures installed support configurations are maintained.

CONCERN NO. 55

The interaction equations used for the design of bolts in Richmond inserts was not performed separate from the design of the inserts (the same as Item #15).

CONCERN NO. 55 (cont'd)

RESOLUTION OF CONCERN

The PSE Engineering Guidelines contained interaction equations for both rods and inserts. For their requalification effort, SWEC has developed a method for qualifying Richmond inserts and associated bolts/rods. Force and moment reactions are obtained from STRUDL-SW output and are first used directly in the interaction equation for qualifying the bolts and later converted to tension and shear for evaluating the inserts.

SWEC Procedure CPPP-7, Attachment 4-5, assures that both the Richmond inserts and the associated bolts will be properly qualified for all safety-related pipe supports.

CONCERN NO. 56

The Unit 1 pipe support drawings had the location plan in the lower right corner deleted from the drawing and placed on the accompanying BRHL once the revision 0 support was installed. However, Unit 2 drawings had the location plan intact. Why were these units treated differently?

RESOLUTION OF CONCERN

Since pipe support location was one of the attributes verified by the As-Built Group and was officially recorded on the BRHL drawing, it was removed from the Unit 1 drawings to avoid double dimensioning. In Unit 2, it remained on the drawing for information purposes only (to give Construction or QC a general idea of where the support was). Official location was still recorded on the BRHL. TU Electric was aware of location plans being transferred to BRHLs.

In the SWEC requalification effort for all safety-related supports, when final design drawings are processed, hanger location information is removed from the face of the pipe support drawing and is officially maintained on the hanger location isometric drawing (BRHL). All SWEC-PSE drawings are approved and controlled in accordance with site Procedure CPSP-11, "TSMD Drawing Preparation."

There are no regulatory requirements as to which drawing must contain the pipe support location plan.

CONCERN NO. 57

There is a concern that consistent design criteria between the different pipe support groups performing design calculations (PSE, NPS and ITT-G) was not required by TUGCO. (Refer to Items 8, 21, 23, 24 and 28c).

CONCERN NO. 57 (cont'd)

RESOLUTION OF CONCERN

SWEC is now the only organization responsible for design of safety-related pipe supports, and as such is applying uniform and consistent design criteria in accordance with their approved QA program. SWEC Procedure CPPP-7 is the governing document used in this requalification effort for piping and pipe supports.

CONCERN NO. 58

There is a concern about design criteria for Hilti bolt spacings less than 10 bolt diameters. A technical letter by John Finneran did exist on this subject; however, the question is whether this letter has an adequate technical basis (refer to item 17). Also, John Finneran issued a memo or letter directing the use of a factor of safety of 4 rather than 5 for Hilti bolt design for the feedwater system (why change requirements).

RESOLUTION OF CONCERN

The referenced letter from John Finneran was CPPA-19,789. The letter dealt with water hammer loads generated from Gibbs & Hill pipe stress analyses for Feedwater and Auxiliary Feedwater Systems. These loads from check valve slam analysis were not cyclic or operational loads. As such they were not related to the concern that prompted the Site to adopt a 5 to 1 Safety Factor for Hilti bolts in response to IE Bulletin 79-02. For this reason, PSE used a 4 to 1 Safety Factor for qualifying Hilti bolts in the Faulted Condition for Feedwater and Auxiliary Feedwater pipe supports.

The factor of safety of 4 to 1 has been established for Hilti bolt design based on IE Bulletin 79-02, Teledyne Report No. 3051-1 Rev. 1 (Generic Response to USNRC IE Bulletin 79-02, dated August 30, 1979), and SWEC procedures.

PSE Guidelines, Section V, paragraph 2.3 originally addressed Hilti bolt spacing of less than 10 bolt diameters. Method 1 of Specification 2323-SS-30 also addressed Hilti bolt qualification where spacing was less than 10 bolt diameters.

In their requalification effort, SWEC-PSE is evaluating all bolt spacings of less than 10 bolt diameters on safety-related pipe supports. The procedure is established in CPPP-7, Attachment 4-4.

CONCERN NO. 59

There is a concern that some design review calculations were stamped with a phrase similar to "functionally design review." However, sometimes a certification stamp was incorrectly put on these drawings which was not correct since the certification calculations had not been performed.

CONCERN NO. 59

RESOLUTION OF CONCERN

Functional review calculations were identical to certification calculations except that the former were performed to design loads and the latter to as-built loads. Application of either stamp to a drawing was an indication that engineering review was complete and final QC inspection could be performed. When functional reviews were initiated in 1984, the utility was aware that several isolated drawings were stamped incorrectly; they were subsequently corrected.

SWEC is recertifying all safety-related pipe supports to loads generated from an as-built analysis. Final designs will be stamped "Certified per CPPP-23" in accordance with SWEC drawing control Procedure CPSP-11. SWEC Procedure CPPP-23 is entitled "Pipe Stress/Support Final Reconciliation Procedure."

CONCERN NO. 60

There is a concern that structural angles used in the design of Class 5 & 6 supports may not have been analyzed correctly, since they are asymmetrical sections and the calculation of their properties and principal axes is tedious. This pertains to designs by NPS.

RESOLUTION OF CONCERN

As part of the SWEC requalification, SWEC Procedure CPPP-7, Table 4.7.2-7, provides structural methodology for calculation of properties of angles. All Class 5 & 6 supports which have not been analyzed to the requirements to CPPP-7 as part of an ASME III stress problem continuation, will be evaluated for adequacy under the Seismic Category II program detailed in SWEC Procedure CPPP-30.

CONCERN NO. 61

There is a concern that pipe support design guidelines were changed by internal memo's issued by a group leader or supervisor and often their superiors were not on distribution. These design guidelines should have been controlled. Also, different pipe support design groups were performing calculations in a different manner.

RESOLUTION OF CONCERN

Comprehensive procedures and instructions have been developed by SWEC for the requalification of piping and pipe supports at CPSES. All activities performed by SWEC are in accordance with these approved procedures and instructions. Additionally, SWEC has issued project Procedure CPPP-14, "Procedure for the Preparation and Control of Project Procedures," which assures that all procedures are prepared, reviewed, approved, issued, revised and controlled in a uniform, consistent and controlled manner.

CONCERN NO. 62

In August, 1985, a gang support was incorrectly shown on a computer listing as supporting 3 pipes, when actually 4 supports were attached to the gang support. A supervisor resisted making changes, therefore, the concern was management's lack of commitment to doing a thorough job.

RESOLUTION OF CONCERN

Due to the lack of specificity, TU Electric is unable to determine the exact support in question. TU Electric management has always been committed to doing a thorough job. Differences of opinion would arise from time-to-time between employees and supervisors regarding pending changes to procedures, calculations, drawings, etc. TU Electric management was and is committed to properly resolving all such concerns.

TU Electric management remains committed to doing a thorough job; this philosophy is shared by SWEC management. Numerous audits have been conducted (22 by SWEC-EA, 12 by TU Electric QA, 1 by SWEC QA Auditing Division, and 1 by the NRC-VPB) and all deficiencies have been promptly addressed. Additionally, SWEC has issued procedure CPPP-1, "Management Plan for Project Quality," to assure all work activities are conducted in accordance with SWEC's approved QA program. The massive effort put forth in the CPRT and CAP (Corrective Action Program) are evidence of fully committed management.

CONCERN NO. 63

No clear cut criteria for Class 5/6 supports existed. The concern is that if these supports are not correctly designed, they might fail and damage safety-related equipment.

RESOLUTION OF CONCERN

Class 5/6 pipe supports are not safety-related. Criteria for the design of Class 5/6 supports exists in Specification 2323-MS-46B, "Non-Nuclear Pipe Hangers and Supports." In addition, several surveys were performed in the field and results incorporated into Specification 2323-MS-46B to focus attention on portions of Class 5 piping which might cause damage to safety-related equipment if it were to fail.

The TU Electric Systems Interactions Group is responsible for assuring that unacceptable interactions between safety-related and non-safety-related components do not occur. All Class 5 and Class 6 pipe supports which have not been reanalyzed to the requirements of SWEC Procedure CPPP-7, as part of an ASME III stress problem continuation, will be evaluated for adequacy under the Seismic Category II program detailed in SWEC Procedure CPPP-30.

CONCERN NO. 64

Supports should be designed to some minimum loads rather than performing analysis on actual loads.

RESOLUTION OF CONCERN

A minimum design load criterion for pipe support design is a conservative criterion that was applied by the various design groups as a prudent measure, but is not a regulatory requirement or a requirement of the ASME Code.

In their requalification effort, SWEC established minimum stiffness values for supports in SWEC Procedure CPPP-7, Section 3.10.8.2 (or actual stiffness for Class 1 problems analyzed by Westinghouse). Guidelines for calculation of stiffness of supports is contained in CPPP-7, Section 4.3.2.2 and Attachment 4-18. Conservative analysis by SWEC assures that supports are properly designed and thus negates a need for a minimum load criterion for support design (supports designed for very small loads may be excessively flexible, therefore, addressing stiffness controls this potential problem).

CONCERN NO. 65

There is a concern over welding performed by NPS in both shop and field with particular concern over minimum weld size violations. The concern is that welds were underspecified on design drawings when compared to Table XVII-2452.1 of Appendix XVII.

RESOLUTION OF CONCERN

During the requalification effort, all safety-related pipe supports will be reviewed under SWEC design Procedure CPPP-7. Section 4.1 and Attachment 4-2 provide the criteria for weld design. Minimum weld size requirements have been deleted in accordance with approved Code Case N-413. Therefore, the technical adequacy of the welds is not in question.