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NUCLEAR REGULATORY COMMISSION

'87 DEC 28 P1:35

before the

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)	Docket Nos. 50-445-OL
)	50-446-OL
TEXAS UTILITIES GENERATING)	
COMPANY et al.)	
)	(Application for an
(Comanche Peak Steam Electric)	Operating License)
Station, Units 1 and 2))	

ANSWERS TO BOARD'S 14 QUESTIONS
(Memo; Proposed Memo of April 14, 1986)
Regarding Action Plan Results Report I.c

In accordance with the Board's Memorandum; Proposed Memorandum and Order of April 14, 1986, the Applicants submit the answers of the Comanche Peak Response Team ("CPRT") to the 14 questions posed by the Board, with respect to the Results Report published by the CPRT in respect of CPRT Action Plan I.c, "Electrical Conduit Supports."

Opening Request:

Produce copies of any CPRT-generated checklists that were used during the conduct of the action plan.

Response:

The only CPRT-generated checklist used in implementation of this Action Plan is provided in Attachment 1, "Train 'C' Conduit Support Calculations Review Checklist (Revision 0)." This was a

DS03

limited-purpose checklist used just twice in the third-party review of Train C conduit support calculations related to procedure development. Use of checklists was discontinued, and subsequent reviews were documented by Technical Memoranda prepared in accordance with Civil/Structural/Mechanical Work Instructions.

Implementation review checklists were also prepared for overview of the implementation of the Train C program. These are not included in this response, as they were not used to support the conclusions reached in the Results Report. The responsibility for implementation overview has been transferred to the TU Electric QA Technical Audit Program.

Question No. 1:

1. Describe the problem areas addressed in the report. Prior to undertaking to address those areas through sampling, what did Applicants do to define the problem areas further? How did it believe the problems arose? What did it discover about the QA/QC documentation for those areas? How extensive did it believe the problems were?

Response:

The problem area addressed in this ISAP was to verify that Train C (non-safety-related) supports and anchorages for conduit 2 inches or less in diameter will maintain their structural integrity during a Safe Shutdown Earthquake (SSE) or, assuming that failure occurs, (1) verify that they will not adversely affect the function of safety-related components or cause injury to occupants of the control room or (2) specify installation of passive seismic restraints to prevent collapse in the event of

support failure so as to preclude unacceptable interactions with safety-related components.

Unit 1 Train C conduit greater than 2 inches in diameter is within the scope of the Systems Interaction Program (previously referred to as the Damage Study Program) and ISAP II.d, and Unit 2 Train C conduit greater than 2 inches in diameter was designed to the same criteria as Trains A and B.

Sample analyses were performed by the Project in the initial phase of the investigation. Utilizing the selected analytical approach, the seismic capability of about 1.8% of the supports in the sample could not be confirmed. Although demonstrating seismic adequacy with a more refined analytical approach and/or testing might have been possible, the Project elected to demonstrate seismic adequacy through a 100% seismic interaction review/qualification program, which was developed by Impell and evaluated by the third party. This program consisted of a multi-level screening process, the details of which are presented in the ISAP I.c Results Report.

The issue arose because in the original design evaluation the assumption was made that conduit 2 inches or less in diameter was inherently capable of withstanding seismic loads such that adverse interactions with safety-related items would not occur. The NRC TRT was unable to find documented justification for this assumption. The lack of documentation justifying seismic adequacy of conduit supports was known to apply to all Train C conduit 2 inches and less in diameter.

The third party did not review QA/QC documentation as part of this Action Plan.

Question No. 2:

2. Provide any procedures or other internal documents that are necessary to understand how the checklists should be interpreted or applied.

Response:

The checklist form used for ISAP I.c was developed following the guidance provided in Design Adequacy Program (DAP) procedures. The following DAP procedures (Attachments 2 and 3) served as guidance for its development and use:

DAP-4, Preparation of Checklists

DAP-5, Review of Calculations, Evaluations and Other
Implementing Documents

Question No. 3:

3. Explain any deviation of checklists from the inspection report documents initially used in inspecting the same attributes.

Response:

The checklist used in this ISAP contained design-related attributes and so is not comparable to QC inspection report documents, which are related to physical inspection attributes. To our knowledge, no previous design-related documents exist that would provide a meaningful comparison to the checklist used.

Question No. 4:

4. Explain the extent to which the checklists contain fewer attributes than are required for conformance to codes to which Applicants are committed to conform.

Response:

The checklist contained the attributes necessary to confirm compliance with the codes and standards applicable to the specific calculations being reviewed.

Question No. 5:

5. (Answer Question 5 only if the answer to Question 4 is that the checklists do contain fewer attributes.) Explain the engineering basis, if any, for believing that the safety margin for components (and the plant) has not been degraded by using checklists that contain fewer attributes than are required for conformance to codes.

Response:

This question is not applicable by reason of the response to question 4.

Question No. 6:

6. Set forth any changes in checklists while they were in use, including the dates of the changes.

Response:

No changes were made to the checklist while it was in use.

Question No. 7:

7. Set forth the duration of training in the use of checklists and a summary of the content of that training, including field training or other practical training. If the training has changed or retraining occurred, explain the reason for the changes or retraining and set forth changes in duration or content.

Response:

The checklist was developed following the guidance of DAP procedures and was used by experienced engineers who worked under the direction of the Issue Coordinator. These individuals were trained in use of the checklist through discussions with the Issue Coordinator and assignments to read the DAP procedures

listed in the response to question 2. No retraining or changes to the training program occurred during implementation of this ISAP.

Question No. 8:

8. Provide any information in Applicants' possession concerning the accuracy of use of the checklists (or the inter-observer reliability in using the checklists). Were there any time periods in which checklists were used with questionable training or QA/QC supervision? If applicable, are problems of inter-observer reliability addressed statistically?

Response:

The two applications of the checklist were performed and checked by experienced and qualified engineers and are therefore believed to be accurate. No time periods of questionable training or supervision were involved. Inter-observer reliability is not applicable to this action plan.

Question No. 9:

9. Summarize all audits or supervisory reviews (including reviews by employees or consultants) of training or of use of the checklists. Provide the factual basis for believing that the audit and review activity was adequate and that each concern of the audit and review teams has been resolved in a way that is consistent with the validity of conclusions.

Response:

No audits were performed regarding the two applications of the checklist.

Question No. 10:

10. Report any instances in which draft reports were modified in an important substantive way as the result of management action. Be sure to explain any change that was objected to (including by an employee, supervisor, or consultant) in writing or in a meeting in which at least one supervisory or management official or NRC employee was present.

Explain what the earlier drafts said and why they were modified. Explain how dissenting views were resolved.

Response:

No substantive modifications were made to the Results Report as a result of management action.

Question No. 11:

11. Set forth any unexpected difficulties that were encountered in completing the work of each task force and that would be helpful to the Board in understanding the process by which conclusions were reached. How were each of these unexpected difficulties resolved?

Response:

As previously mentioned, early in the sample analyses of conduit runs, determination was made to resolve the ISAP concerns through a 100% seismic interaction review/qualification program rather than a sampling-based program.

Question No. 12:

12. Explain any ambiguities or open items in the Results Report.

Response:

To the best of our knowledge, no ambiguities or open items exist in the Results Report. Implementation of the seismic interaction review/qualification program for Train C conduit by Impell Corporation is ongoing, with overview by the TU Electric QA Technical Audit Program.

Question No. 13:

13. Explain the extent to which there are actual or apparent conflicts of interest, including whether a worker or supervisor was reviewing or evaluating his own work or supervising any aspect of the review or evaluation of his own work or the work of those he previously supervised.

Response:

No known actual or apparent conflicts of interest were associated with implementation of this Action Plan. Neither Impell Corporation nor third-party personnel were associated with the original design work.

Question No. 14:

14. Examine the report to see that it adequately discloses the thinking and analysis used. If the language is ambiguous or the discussion gives rise to obvious questions, resolve the ambiguities and anticipate and resolve the questions.

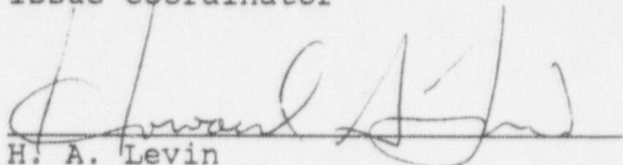
Response:

The Issue Coordinator and others who aided in the preparation and approval of the Results Report have reviewed and checked the report for clarity and believe that no ambiguities exist.

Respectfully submitted,



C. P. Mortgat
Action Plan I.c
Issue Coordinator



H. A. Levin
Review Team Leader

The CPRT Senior Review Team has reviewed the foregoing responses and concurs in them.

ISAP I-C
 TRAIN "C" CONDUIT SUPPORT CALCULATION REVIEW CHECKLIST (REV. 0)

REVIEW DOCUMENT

REVIEWER _____ DATE _____
 CHECKER _____ DATE _____
 APPROVAL _____ DATE _____

REVIEW AREA	ITEM/ISSUE DESCRIPTION	ATTRIBUTE NUMBER	ATTRIBUTE	CALCULATION SECTION (IF APPLICABLE)	SATISFACTORY			COMMENT NUMBER
					YES	NO	NA/NC	
Design Parameters	General Supports	1.1.1	Design parameters used in the calculation are clearly defined or referenced.					
		1.2.1	Calculation is performed using the correct properties and dimensions of the support members.					
		1.2.2	Calculation uses the actual self-weight of the support.					
		1.2.3	Calculation indicates catalog number for all vendor supplied support component parts.					
		1.2.4	Support material is in accordance with the provisions of the appropriate design procedure.					
		1.2.5	Welding material is in accordance with the provisions of the appropriate design procedure.					
		1.2.6	Anchor bolt material is in accordance with the provisions of the appropriate design procedure.					
1.2.7	Connection bolt material is in accordance with the provisions of the appropriate design procedure.							

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					YES	NO	N/A/NC	
		1.2.8	Calculation uses correct "As-built" information obtained from the field walkdown sketch.					
	Conduit/ Fittings	1.3.1	Calculation is performed using the correct properties and dimensions of the conduit.					
		1.3.2	Calculation is performed using the correct properties and dimensions of the junction boxes.					
		1.3.3	Calculation is performed using the correct properties and dimensions of conduit clamps and straps.					
		1.3.4	Conduit material is in accordance with the provisions of the appropriate design procedure.					
		1.3.5	Junction Box material is in accordance with the provisions of the appropriate design procedure.					
		1.3.6	Clamp and strap material is in accordance with the appropriate design procedures.					
		1.3.7	Calculation uses maximum conduit fill weight as shown in Table 2.2 of Impell Report PI-0210-053-001.					
		1.3.8	Calculation uses actual conduit fill weight based on field cable routing.					
		1.3.9	Calculation uses actual (or conservative) tributary spans between transverse supports and includes the effect of construction tolerances.					

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					YES	NO	NA/NC	
Loads and Load Combinations		1.3.10	Calculation uses actual (or conservative) tributary spans between vertical supports and includes the effect of construction tolerances.					
		1.3.11	Calculation uses actual (or conservative) spans between longitudinal supports and includes the effect of construction tolerances.					
		2.1.1	Loads and load combinations used in the calculations are clearly referenced.					
		2.2.1	Calculation considers the correct dead load (D), including the weight of conduit, support, fittings, and attachments.					
		2.3.1	Calculation considers the correct safe shutdown earthquake loads (Feqs).					
		2.3.2	Calculation uses a 7% damping value for the SSE or provides justification for the use of a higher damping value.					
		2.3.3	Note: Some early hand calculations for the original criteria use 3% damping. Omission of thermal loads in calculation is justified based on support location and/or configuration.					

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	Load Combination	2.4.1	Calculation considers the following load combinations when elastic working stress methods are used: (1) D+Feqs			
		2.4.2	Calculation considers the following load combinations when plastic design methods are used: (1) D+Feqs			
		2.4.3	Calculation combines seismic loads by either the SRSS or the CQC method and then adds the combined response directly to other applicable loads.			
		2.4.4	Calculation considers seismic responses with arbitrary signs to be combined such that the worst case is obtained.			
Acceptance Criteria and Qualification	General	3.1.1	Acceptance criteria or qualifications used in the calculations are clearly referenced.			
		3.1.2	Calculations which qualify a support as "always acceptable", consider the worst combination of the following design attributes: (a) Support orientation/configuration (b) Support and support component dimensions, properties and materials			

ISAP I.C. ATTACHMENT 1
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		3.1.3	(c) Vertical, transverse, and longitudinal spans (d) Anchorage details (e) Conduit design loads (f) Seismic acceleration (g) Seismic participation factor (h) Construction tolerances (i) Number of conduits Calculations for qualification of a support by similarity is based on consideration of the following design attributes: (a) Support orientation/configuration (b) Support and support component dimensions, properties, and materials (c) Anchorage details and longitudinal, vertical, and transverse spans (e) Conduit design loads (f) Seismic forces or accelerations (g) Number of conduits			
	Codes and Standards	3.2.1	Calculation indicates that hot-rolled structural steel shapes are qualified per the provisions of the AISC Code (1969).			
		3.2.2	Calculation indicates that welds are qualified per the provisions of AWS D1.0-69.			
		3.2.3	Calculation indicates that cold formed steel shapes are qualified per the provisions of the AISI Code (1968).			
		3.2.4	Calculation references provision of Impell design Criteria.			

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	Stress and Deformation Criteria	3.3.1	Calculation indicates that for hot-rolled steel shapes, the design stress using elastic methods does not exceed the values given in the Impell design criteria				
		3.3.2	Calculation indicates that for cold formed steel members, the design stress using elastic methods does not exceed the values given in the Impell criteria				
		3.3.3	Allowable loads for catalog components are in agreement with manufacturer's recommendations or are justified by test data.				
		3.3.4	For those supports qualified by testing, the calculation clearly identifies the allowable design valves and the test used to establish the valves.				
		3.3.5	Calculation does not consider a 33 percent increase in allowable stresses when considering seismic loadings				

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					YES	NO	NA/NC	
		3.3.6	Calculation qualifies support by fatigue analysis in accordance with the methods and data contained in the Impell design criteria.					
		3.3.7	Calculation qualifies support by ductility analysis in accordance with the methods and data contained in the Impell design criteria.					
		3.3.8	Calculation considers stress factors or factors of safety for catalog component which do not violate manufacturer's recommendations.					
	Supports Members	3.4.1	Calculation considers the following design attributes when considering the slenderness ratios of compression members: (a) Effective length and boundary conditions. (b) Sidesway (c) Lateral bracing provided by the conduit.					

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		3.4.2	Calculation considers the effect of twist buckling.			
		3.4.3	Calculation correctly identifies braces as primary or secondary members.			
		3.4.4	Calculation applies the requirements of AISC Section 1.18.2.4 to double angle braces.			
		3.4.5	Calculation uses average yield strength values of Unistrut members given in Table 1 of Impell Report #0210-031-01.			
		3.4.6	Calculation considers the effect of eccentricities due to construction tolerances on trapeze compression members.			
		3.4.7	Calculation evaluates both direct shear and torsional shearing stresses.			
		3.4.8	Calculation considers the effect of unbraced compression flange on the allowable bending stress.			

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		3.6.9	Calculation considers the effect of bolt holes on member section properties.			
		3.4.10	Calculation does not specify Unistrut use which is in violation of manufacturer's recommendations.			
		3.6.11	Calculation considers the following effects on angles: (a) Concrete bearing on the angle ends (b) Principal axis considerations			
	Supports Bolted Connections	3.5.1	Calculation considers the effect of oversized bolt holes on bearing connections.			
		3.5.2	Calculation checks minimum edge distances.			
		3.5.3	Calculation evaluates bolted connections for hot-rolled structural shapes per the applicable provisions of the AISI Code (1969).			
		3.5.4	Calculation considers the effect of rotations of pinned connections.			
	Supports Unistrut Connections	3.6.1	Calculation uses allowable pullout and slip values for Unistrut bolted connection based on Section 4.3.2 of Impell Report #0210-051-01.			

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		3.6.2	Calculation uses appropriate interaction equation in accordance with Impell design criteria when evaluating combined pullout and slip on Unistrut bolted connection.			
		3.6.3	Calculation includes net shear load component on Unistrut bolted connection when required by support configuration or loading condition.			
		3.6.4	Calculation uses appropriate interaction equation in accordance with Impell design criteria when evaluating combined pullout, slip, and side shear on Unistrut bolted connections.			
	Supports Welded Connections	3.7.1	Calculation considers the following effects on welded connections: (a) Eccentric loads on weld patterns (b) Base material thickness (c) Calculation of weld length near angle toes			
		3.7.2	Calculation considers the effect of weld undercut on support members.			

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		3.7.3	Calculation uses allowable weld stresses contained in Impell design criteria.			
	Supports Anchor Bolt	3.8.1	Calculation uses average ultimate tensile and shear loads for Hilti-kwik bolts contained in Impell design criteria.			
		3.8.2	Calculation uses an anchor bolt factor of safety of 3.0.			
		3.8.3	Calculation considers the following effects on anchor bolt design: (a) Concrete strength (b) Embedment depth (c) Spacing Requirements (d) Edge distances (e) Cracked tension sections of concrete (f) Cyclic loadings (g) Anchorage shared with other structures (h) Reduced allowables for cluster inserts (i) Expansion anchors installed in core drilled holes (j) Reduced embedment due to bolt placement in the architectural floor topping			

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		3.8.4	Calculation checks combined tension and shear on Hilti-Kwik bolts using interaction equation given in Impell design criteria.			
		3.8.5	Calculation uses the appropriate value given in the Impell design criteria to increase in the Hilti-kwik bolt actual tensile load to account for the effects of baseplate flexibility and prying action.			
		3.8.6	Calculation considers moment induced in the anchor bolts due to shear applied above the concrete surface.			
		3.8.7	Calculation properly addresses the method for justifying the use of any anchorage other than Hilti-kwik bolts.			
		3.8.8	Calculation does not specify anchor bolt use which is in violation of manufacturer's recommendations.			
	Supports Embedded Plates	3.9.1	Calculation clearly identifies "Footprint" loads and transmits these loads to an interfacing organization for approval.			

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					YES	NO/NA/NC	
		3.9.2	If the calculation analyses embedded plates, the following effects are considered: (a) Load components (b) Interaction of load components (c) Prying action on Nelson studs (d) Minimum distances between adjacent attachments on single embedded plate. (e) Capacity reductions per G&H Spec. 2323-SS-30. (f) Spacing requirements between embedded plates and expansion anchors.				
	Conduits/ Fittings	3.10.1	Calculation clearly indicates the source/reference of allowable conduit stress values used.				
		3.10.2	Calculation clearly indicates the source/reference of allowable junction box stress values used.				
		3.10.3	Calculation considers the following effects on conduit and junction box design: (a) Load components (b) Interaction of load components (c) Splices, threads, fittings, and hardware.				
		3.10.4	Calculation does not specify any conduit, conduit fitting, or junction box use that is in violation of manufacturer's recommendations.				

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					YES	NO	
		3.10.5	Calculation qualifies protruded conduit penetrations for use as a multi-directional support.				
	Clamps	3.11.1	Calculation uses the conduit clamp load values in each of three orthogonal directions as shown in Impell design criteria				
		3.11.2	Calculation does not specify clamp/strap use that is in violation of manufacturer's recommendations.				
		3.11.3	Calculation clearly identifies the source/reference of allowable loads used for one-hole pipe straps.				
		3.11.4	Calculation uses the methods given in the Impell design criteria when evaluating the effects of combined loading on conduit clamps				
		3.11.5	Calculation uses the methods given in the Impell design criteria when evaluating the combined loading on one-hole pipe straps.				

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					YES	NO	NA/NC	
Seismic Design/Analysis Methods	General	4.1.1	Calculation relies on appropriate computer programs which are capable of adequately performing the analysis.					
		4.1.2	Computer programs used in the calculation have documented QA verification.					
	Modeling Considerations	4.2.1	Model considers the load carrying capacity of both transverse and longitudinal supports in all three directions.					
		4.2.2	Proper element types were selected for use in the model.					
		4.2.3	Discretization of the model (number of nodes, degrees of freedom, aspect ratio) are correctly specified.					

ATTACHMENT 1

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		4.2.4	Load eccentricities are correctly simulated by the model.			
		4.2.5	Eccentricities due to construction tolerances are properly considered.			
		4.2.6	Member end conditions are realistically represented by the model.			
		4.7.7	Anchorage boundary conditions are accurately represented.			
		4.2.8	Analysis considers the correct conduit axial, bending, torsional, and shearing stiffnesses.			
		4.2.9	Analysis considers the correct transverse and longitudinal stiffnesses of the junction boxes.			
		4.2.10	Clamp stiffnesses are correctly simulated in all three directions.			
		4.2.11	Boundary conditions at the conduit/support attachment point are appropriately modeled.			
		4.7.12	The correct sectional properties are used in the analysis.			
		4.2.13	The correct material properties are used in the analysis.			

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		4.2.14	All default parameters are appropriate.			
		4.2.15	Model was plotted and the Plot matches the actual configuration of the support system.			
		4.2.16	Unsymmetric and non-tubular sections are correctly modeled.			
		4.2.17	Symmetry was correctly employed to reduce model size.			
		4.2.18	Analysis considers the following effects: (a) Torsion in support members due to longitudinal load offset. (b) Torsion in support members due to vertical load offset. (c) Bending of support members due to vertical load offset. (d) Bending of support members due to transverse load offset.			
		4.2.19	Systems and system boundaries are properly defined.			
		4.2.20	System boundary conditions are correctly defined.			

ATTACHMENT I

ISAP I.C
 TRAIN "C" CONDUIT SUPPORT CALCULATION REVIEW CHECKLIST (REV. 0)

REVIEW DOCUMENT

REVIEWER _____
 CHECKER _____
 APPROVAL _____

DATE _____

DATE _____

DATE _____

REVIEW AREA	ITEM/ISSUE DESCRIPTION	ATTRIBUTE NUMBER	ATTRIBUTE	CALCULATION SECTION (IF APPLICABLE)	SATISFACTORY YES/NO/NA/NC	COMMENT NUMBER
		4.2.21	Modeling of lumped masses and stiffness elements closely approximates the actual structure.			
		4.2.22	Subsystem modeling is performed in accordance with checklist C/S-G021 Section 4.0.			
		4.2.23	Calculation develops an appropriate system model for a Response Spectra Analysis.			
		4.2.24	Calculation develops an appropriate system model for a Time History Analysis.			
		4.2.25	The following items are considered when there is interaction between a subsystem and adjacent subsystems: (a) Justification of the assumptions regarding interaction of adjacent subsystems (b) Individual subsystem model is analyzed and its behavior compared to the behavior of the model which includes interaction of adjacent subsystems.			

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TRAIN "C" COMMIT SUPPORT CALCULATION REVIEW CHECKLIST (REV. 0)

REVIEW DOCUMENT

REVIEWER

DATE

CHECKER

DATE

APPROVAL

DATE

REVIEW AREA	ITEM/ISSUE DESCRIPTION	ATTRIBUTE NUMBER	ATTRIBUTE	CALCULATION SECTION (IF APPLICABLE)	SAFETY FACTORY YES/NO/NA/NC	COMMENT NUMBER
	Equivalent Static Analysis	4.3.1	Calculation uses the correct floor response spectra (refined).			
		4.3.2	Calculation uses 7 percent damping and 4 percent damping values for the SSE and OBE respectively.			
		4.3.3	Calculation correctly determines the fundamental frequency of the system.			
		4.3.4	Calculation uses the peak value of the response spectrum multiplied by a multi-mode amplification factor of 1.5.			
		4.3.5	Calculation uses actual response spectrum value multiplied by a multi-mode amplification factor of 1.5 if the fundamental frequency has been calculated.			
		4.3.6	Zero Period Acceleration of the floor response spectra are used when the system frequency is greater than 33 Hz.			
		4.3.7	Calculation provides justification for using multi-mode amplification factor less than 1.5.			

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TRAIN "C" CORROBIT SUPPORT CALCULATION REVIEW CHECKLIST (REV. 0)

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REVIEW AREA	ITEM/ISSUE DESCRIPTION	ATTRIBUTE NUMBER	ATTRIBUTE	CALCULATION SECTION (IF APPLICABLE)	SATISFACTORY YES/NO/NA/NC	COMMENT NUMBER
	Dynamic Analysis	4.4.1	Calculation considers an appropriate number of modes and cut-off frequencies.			
		4.4.2	Calculation combines modal responses in accordance to the appropriate design requirements.			
		4.4.3	Calculation uses the correct floor response spectra (refined).			
		4.4.4	Calculation uses 7 percent and 4 percent damping values for the SSE and the OPE respectively.			

ATTACHMENT 1

TRAIN "C" CONDUIT SUPPORT CALCULATION REVIEW CHECKLIST (REV. 0)

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REVIEW DOCUMENT

REVIEW AREA	ITEM/ISSUE DESCRIPTION	ATTRIBUTE NUMBER	ATTRIBUTE	CALCULATION SECTION (IF APPLICABLE)	SATISFACTORY YES NO NA NC	COMMENT NUMBER
Design Control	Results	4.5.1	Are the results consistent with the modeling assumptions?			
		4.5.2	Have the results been reviewed for the following items: (a) Large deflections/deformations (b) Yield stress exceeded (c) Instability (lateral, torsional, local)			
		4.5.3	Has the reasonableness of the structural response been checked in the following areas: (a) Deflected shapes (b) Mode shapes (if calculated) (c) Equilibrium checks (d) Force and moment variation (e) Stress variation			
	Design Control	Calculation Documentation	4.5.4	Are the analysis results traceable when used in other calculations or drawings?		
5.1.1			Cover sheet indicates the safety classification of the calculation.			
5.1.2			Cover sheet clearly states the title/subject of the calculation.			
5.1.3			Cover sheet clearly shows the revision level and gives an indication of the work done in each revision level.			
		5.1.4	Cover sheet is signed and dated for each revision level.			

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TRAIN "C" CONDUIT SUPPORT CALCULATION REVIEW CHECKLIST (REV. 0)

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REVIEW AREA	ITEM/ISSUE DESCRIPTION	ATTRIBUTE NUMBER	ATTRIBUTE	CALCULATION SECTION (IF APPLICABLE)	SATISFACTORY		COMMENT NUMBER
					YES	NO	
		5.1.5	Each calculation sheet is clearly titled in a manner consistent with the title on the cover sheet.				
		5.1.6	Each calculation sheet is signed/dated by the originator and checker for each revision level shown.				
		5.1.7	Each calculation sheet is sequentially numbered.				
		5.1.8	Calculation is mathematically correct.				
	Purpose	5.2.1	The purpose of the calculation is clearly stated.				
		5.2.2	Appropriate acceptance criteria is specified.				
		5.2.3	Limitations of the calculation are identified.				
	Design Documents	5.3.1	Drawings which are generated as a result of the calculation are identified.				
		5.3.2	Other calculations which are generated as a result of the calculation are identified.				
		5.3.3	Design information which must be transmitted to other design organizations, such as the "footprint" loads on embedded plates, is properly documented.				

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TRAIN "C" CONDUIT SUPPORT CALCULATION REVIEW CHECKLIST (REV. 0)

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REVIEW AREA	ITEM/ISSUE DESCRIPTION	ATTRIBUTE NUMBER	ATTRIBUTE	CALCULATION SECTION (IF APPLICABLE)	SATISFACTORY		COMMENT NUMBER
					YES	NO	
References		5.4.1	References are clearly defined by Title, Revision, and Date.				
		5.4.2	Reference material conforms to industry/discipline standards.				
		5.4.3	Correspondence relevant to the calculation is included in the list of references.				
		5.4.4	Calculations utilizing computer printouts give the run number, date, program title, and number.				
		5.4.5	Computer programs used in the generation of calculation data have been Q.A. verified.				
Input Data		5.5.1	Sources of input data are clearly identified.				
		5.5.2	Input data is consistent with the design criteria.				
		5.5.3	Sources of input data are verified documents.				
Assumptions		5.6.1	Assumptions used in the calculation are clearly defined.				
		5.6.2	Assumptions requiring inter confirmation are tracked and eventually closed.				
		5.6.3	Assumptions are compatible with design criteria.				

ISAP I-C
TRAIN "C" CONDUIT SUPPORT CALCULATION REVIEW CHECKLIST (REV. 0)

REVIEW DOCUMENT

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REVIEW AREA	ITEM/ISSUE DESCRIPTION	ATTRIBUTE NUMBER	ATTRIBUTE	CALCULATION SECTION (IF APPLICABLE)	SATISFACTORY		COMMENT NUMBER
					YES	NO/NA/NC	
Design Drawings	Design Changes	5.7.1	All modifications, out-of-tolerance as-built conditions are incorporated into the calculation.				
		6.1.1	Support is uniquely defined.				
		6.1.2	Support elevation and building location is clearly shown on the drawing.				
	Conduit	6.1.3	Drawing clearly indicates attachments of other systems such as instrumentation tubing, or small bore piping to the conduit support.				
		6.1.4	Design drawings/sketches accurately represent configurations used in the design calculations				
		6.2.1	Conduits are located dimensionally on the support.				
		6.2.2	Conduit span lengths are properly defined.				
		6.2.3	Conduit sizes are clearly shown.				
		6.2.4	Conduit to structure attachment is correctly detailed.				
		6.2.5	Conduit splices, condulets, and other miscellaneous fittings are identified.				
		6.7.6	Drawing indicates whether conduit is rigid or flexible				

ISAP I.C
TRAIN "C" CONDUIT SUPPORT CALCULATION REVIEW CHECKLIST (REV. 0)

REVIEW DOCUMENT

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REVIEW AREA	ITEM/ISSUE DESCRIPTION	ATTRIBUTE NUMBER	ATTRIBUTE	CALCULATION SECTION (IF APPLICABLE)	SATISFACTORY		COMMENT NUMBER
					YES	NO/NA/RC	
	Structural Details	6.3.1	Structural components are properly dimensioned.				
		6.3.2	Structural member sizes are specified.				
		6.3.3	Working points are clearly defined.				
		6.3.4	Gusset plates are correctly detailed.				
		6.3.5	Braces are adequately detailed.				
		6.3.6	All bolt holes are shown on the drawing.				
	Weld Details	6.4.1	Welds are detailed by type, size, and length.				
		6.5.1	Baseplates are properly dimensioned.				
	Anchorage Details	6.5.2	Attachments to embedded plates are dimensionally located.				
		6.5.3	An anchorage's close proximity to embedded plates, edges of concrete, or other supports is shown on the drawing.				
		6.5.4	Anchor bolt type, size, projection, and embedment length is shown on the drawing.				

ISAP 1.c
TRAIN "C" CONDUIT SUPPORT CALCULATION REVIEW CHECKLIST (REV. 0)

REVIEW DOCUMENT

REVIEWER

DATE

CHECKER

DATE

APPROVAL

DATE

REVIEW AREA	ITEM/ISSUE DESCRIPTION	ATTRIBUTE NUMBER	ATTRIBUTE	CALCULATION SECTION (IF APPLICABLE)	SAFETY FACTORY YES/NO/NA/NC	COMMENT NUMBER
Special Studies	General Criteria	7.1.1	Calculation incorporates the findings/results of the following Impell Special Studies as appropriate:			
			Longitudinal loads on cantilever supports.			
		7.1.2	Req ductility of short trapeze supports.			
		7.1.3	Horizontal capacity of beam clamps.			
		7.1.4	Finger clamps and system models including junction boxes.			
		7.1.5	Impact loads on rods.			
		7.1.6	Interaction equation for finger clamps.			
		7.1.7	Cone interaction and edge distance check.			
		7.1.8	Branch conduits.			
		7.1.9	SRSS rigid mode response.			
		7.1.10	Multi-mode factor.			
		7.1.11	Prying factor			
		7.1.12	Double SRSSing of conduit loads.			
7.1.13	As-built walkdown discrepancies.					

ISAP I.C
 TRAFFIC CONDUIT SUPPORT CALCULATION REVIEW CHECKLIST (REV. 0)

REVIEW DOCUMENT

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DATE

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APPROVAL

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REVIEW AREA	ITEM/ISSUE DESCRIPTION	ATTRIBUTE NUMBER	ATTRIBUTE	CALCULATION SECTION (IF APPLICABLE)	SATISFACTORY		COMMENT NUMBER
					YES	NO/NA/NC	
Summary	General Criteria	7.1.14	Side-shear on Unistrut.				
		7.1.15	Combinations of multil-conduit loads.				
		7.1.16	Self-weight of supports.				
		8.1.1	Calculation fulfills all commitments of the Impell design criteria.				

COMANCHE PEAK RESPONSE TEAM
DESIGN ADEQUACY PROCEDURE ADDENDUM

Procedure: DAP-4
Revision: 4
Addendum: 1

Title: COMPLETION OF TYPE "C" CHECKLIST SUPPLEMENTS

PURPOSE

This addendum allows Type "C" checklist supplements to include only those pages of a Type "C" checklist containing attributes affected during the supplement process.

SCOPE

Add to Section 5.4, paragraph 1, after sentence 4 (p. 8), the following:

Alternatively, the supplement may consist of only those pages which contain attributes whose status is affected by the supplement preparation process. In such cases, attributes on the affected checklist pages that are not changed by the supplement shall be marked "NC." The checklist supplement shall be clearly identified on the checklist cover sheet including a listing of the affected pages.

INSTRUCTION

This addendum is retroactive to September 12, 1986, and shall remain in effect until approval of the next revision of DAP-4. This addendum shall be securely attached to each controlled copy of DAP-4.

Prepared By: DSM [Signature]

Date: 2/4/87

Reviewed By: Frank [Signature]

Date: 2/5/87

Approved By: [Signature]

Date: 2/6/87

TITLE PREPARATION OF CHECKLISTS						
NUMBER DAP-4						
Revision	Prepared	Date	Reviewed	Date	Approved	Date
0	<i>J. Dougherty</i> M. BROOKS for M. Brooks	9/9/85	<i>J. Dougherty</i>	9/9/85	<i>H. J. Jerni</i>	10/4/85
1	<i>Edye Roberts</i>	10/23/85	<i>J. Dougherty</i>	10/24/85	<i>H. J. Jerni</i>	10/24/85
2	<i>Edye Roberts</i>	11/13/85	<i>J. Dougherty</i>	11/27/85	<i>H. J. Jerni</i>	12/9/85
3	<i>Edye Roberts</i>	1/6/86	<i>J. Dougherty</i>	1/08/86	<i>H. J. Jerni</i>	1/15/86
4	<i>TK by</i>	9/10/86	<i>J. Dougherty</i>	9/10/86	<i>H. J. Jerni</i>	9/12/86

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COMANCHE PEAK RESPONSE TEAM - DESIGN ADEQUACY PROCEDURE

Number: DAP-4

Title: PREPARATION OF CHECKLISTS

Revision: 4

1.0 PURPOSE

This procedure specifies the requirements for preparation of design document review checklists to be used in the performance of the CPSES Design Adequacy Program (DAP).

2.0 SCOPE

This procedure applies whenever a design document review checklist is required by a Discipline Specific Action Plan, a DAP procedure, or through a Discipline Instruction issued by the Review Team Leader, Design Adequacy Program Manager, or Discipline Coordinator.

3.0 DEFINITIONS AND RESPONSIBILITIES

3.1 Definitions

3.1.1 Criterion

A criterion is any statement of a performance, design feature, or design requirement which a system, structure, or component must meet in order to be capable of performing its design function or to be in compliance with a project requirement or commitment.

3.1.2 Commitment

A commitment is any statement made by the project as part of the public record which identifies a system performance requirement, design feature, or design requirement which will be met by the project.

COMANCHE PEAK RESPONSE TEAM - DESIGN ADEQUACY PROCEDURE

Number: DAP-4

Title: PREPARATION OF CHECKLISTS

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3.1.3 Implementing Document

Implementing documents are design documents (such as calculations, evaluations, and analyses) that translate design criteria into design output documents.

3.1.4 Output Document

Output documents are design documents (such as drawings and specifications) that define technical requirements of systems, structures, and components.

3.2 Responsibilities

3.2.1 Checklist Developer

Checklists shall be developed by personnel assigned by the Discipline Coordinator. The Discipline Coordinator may also be a checklist developer.

3.2.2 Discipline Coordinator

The Discipline Coordinator shall assign personnel to develop checklists. He shall define the purpose and scope of each checklist. This definition may be in the form of verbal direction to checklist developers.

4.0 INSTRUCTION

4.1 Evaluation Design Criteria and Review Topics

Checklists will be prepared to ensure a consistent and complete review of design criteria for the various review topic areas. Design Criteria Review Checklists shall be prepared using the format of Attachment A for each design discipline



COMANCHE PEAK RESPONSE TEAM - DESIGN ADEQUACY PROCEDURE

Number: DAP-4

Title: PREPARATION OF CHECKLISTS

Revision: 4

review topic area to verify that the review topic criteria are complete, consistent, and adequately defined. Design Review Summary Checklists shall also be prepared using the format of Attachment B to summarize the verification of the implementation of the review topic criteria. Where appropriate, the Discipline Coordinator may allow more than one review area to be evaluated on a single checklist (Attachment A or B). The Discipline Coordinator may authorize alternatives to the format of Attachments A and B; however, the alternative format shall contain comparable information. The Discipline Coordinator shall maintain a log of checklists used in the format of Attachment G to this procedure. This log meets the requirements of DAP 11 and shall be filed in accordance with DAP 14.

4.2 Preparation of Checklists

Unless otherwise directed by the Discipline Coordinator, Design Criteria and Design Review Summary Checklists shall be prepared in accordance with the format of Attachments A and B for the various review topics. The Discipline Coordinator shall assign one or more individuals to the preparation and completion of the checklists. The Discipline Coordinator may develop checklists.

Design Review Evaluation Checklist forms are prepared as appropriate using the format of Attachments C-1 and C-2. Attachment C-2 is the format for continuation pages. As used herein, Attachment C refers to both C-1 and C-2. Alternate formats may be used provided they contain comparable information. The criteria/commitments (from the list developed in accordance with DAP-1) applicable to the scope of the checklist form are reviewed and selected for inclusion on the checklist. The checklist preparer may select fewer than 100 percent of the applicable criteria for inclusion in the Design Review Evaluation form(s) provided that the bases for such selection are documented in the Design Review Summary Checklist (Attachment B) form or in another appropriately referenced document. Where a criterion/commitment listed in the criteria/commitments list is itself a source of detailed criteria that is not

COMANCHE PEAK RESPONSE TEAM - DESIGN ADEQUACY PROCEDURE

Number: DAP-4

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expanded upon in the Criteria List (DAP-1), the checklist should use the detailed criteria extracted from that source. The selected criteria/commitments (including more detailed criteria obtained from the source document) are entered in the "Attributes Reviewed" column of Attachment C.

The "Description of Verification" column of Attachment C shall be completed to describe the method by which implementation of the criterion will be verified (e.g., line-by-line check of a calculation, comparison of selected calculation pages against selected drawings, etc.). If necessary, this column may be cross-referenced to an attachment that contains more information on the verification methodology. If the criterion entered in the "Attributes Reviewed" column does not represent adequate acceptance criteria for the review then the "Description of Verification" column should also be used to provide necessary acceptance criteria detail.

Specific documents to be reviewed are selected in accordance with DAP-21. Where appropriate, development of the Design Review Evaluation form and the selection of specific documents may proceed in parallel if necessary to ensure the adequacy of the checklist form. In addition, the person preparing the Design Review Evaluation form should also give consideration to the following factors:

- o Whether similar document types exist such that a combination of document types is needed to reach a conclusion about the adequacy of a portion of the design process (e.g., there may be eight types of mechanical calculations and selecting one of each type, as required above, may provide an adequate test of the calculation process such that no significant benefit is gained from testing multiple examples within each type)
- o Whether the criteria that could be verified by additional examples of the document type can also be verified by other document types or through other means (e.g., by comparison with pre-operational test results).

COMANCHE PEAK RESPONSE TEAM - DESIGN ADEQUACY PROCEDURE

Number: DAP-4

Title: PREPARATION OF CHECKLISTS

Revision: 4

4.3 Additional Checklist Items

In addition to the specific checklist attributes extracted from the criteria/commitments list, the checklist developer shall consider the items in Attachments D and E and shall incorporate them into the checklist as determined to be appropriate by the checklist developer and the Discipline Coordinator. In considering these items (which are defined in ANSI N45.2.11-1974, Section 6.3.1), the developer and Discipline Coordinator shall take into consideration that not all items are applicable to each document type, that other aspects of the review may adequately address these topics, and that the wording of the item may need to be clarified for use in the checklist.

4.4 Approval of Checklists Formats

Each Discipline Coordinator shall approve all checklist forms developed for his discipline. This approval requirement applies to Design Review Evaluation forms (whether in the format of Attachment C or in an alternative format), to checklist forms that are used as alternatives to Attachments A and B (Discipline Coordinator approval of Attachments A and B is not required), and to any other checklists developed for his discipline. The approval of the Discipline Coordinator to use a checklist form shall be in the form of a memo to appropriate personnel authorizing them to use the forms noted in the memo. Supplemental attributes added to a checklist form in accordance with Section 4.5 below shall not require Discipline Coordinator approval prior to completion of the checklist.

4.5 Use of Checklist

Other DAP procedures and discipline instructions govern the use of checklist forms developed in accordance with this procedure. Prior to using any checklist form to conduct a review in accordance with a procedure governing its use, the person intending to use the checklist form shall assure himself or herself that the

COMANCHE PEAK RESPONSE TEAM - DESIGN ADEQUACY PROCEDURE

Number: DAP-4

Title: PREPARATION OF CHECKLISTS

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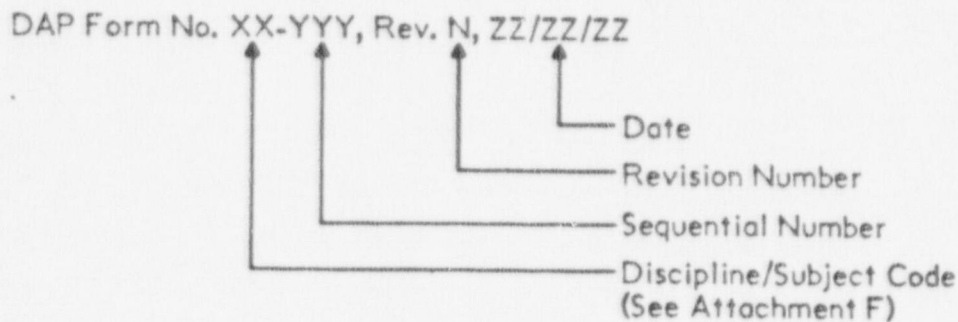
checklist form is adequate for its intended purpose. In particular, the user shall consider whether any item on Attachments D and E should be added to the checklist form. Furthermore, the reviewer may add any additional attributes that he or she feels is necessary to ensure the adequacy of a design review evaluation form (Attachment C or equivalent). Such additional attributes or other checklist form supplements may be added without prior Discipline Coordinator approval. Discipline Coordinator approval is achieved when the completed checklist is approved.

5.0 DOCUMENTATION

5.1 Identification Of Checklist Forms

Design review evaluation checklist forms (i.e., checklist forms similar to the format of Attachment C that contain the review attributes, but which have not been used for a review) shall be given a checklist form number, revision number, and date. The checklist form number shall be placed in the lower right hand corner of each page of the form if Attachment C is used; otherwise the checklist form number may be placed where it is deemed appropriate by the Discipline Coordinator. The initial version of each form is designated "Rev. 0".

The format of the checklist identification shall be:



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This numbering requirement for checklist forms is retroactive and shall be applied to all checklist forms. The Discipline Coordinator shall maintain a log of checklist forms (See Attachment G).

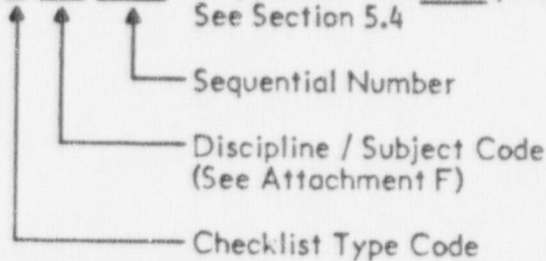
5.2 Revision of Checklist Forms

The Discipline Coordinator may direct that checklist forms be revised at anytime. Unless specifically directed by the Discipline Coordinator, the revision of a checklist form shall not invalidate any checklist completed using a previous revision of a checklist form. The appropriate revision number and date shall be entered onto the forms. The sections of the form affected by the revision shall be marked with a vertical line and revision number in either the left or right hand margin of the form. Supplemental attributes entered into a checklist by a reviewer in accordance with Section 4.5 of this procedure shall not be considered revisions to the checklist form.

5.3 Checklist Identification

After approval of a completed checklist has been obtained in accordance with the DAP governing its use, the checklist shall be assigned a control identification number by the Discipline Coordinator. The identification number shall be of the following format:

DAP-CLZ-XX-YYY (Supplement No. ____), Rev. ____.
See Section 5.4



- A = Design Criteria Review Checklist (Attachment A)
- B = Design Review Summary Checklist (Attachment B)
- C = Design Review Evaluation (Attachment C)



COMANCHE PEAK RESPONSE TEAM - DESIGN ADEQUACY PROCEDURE

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The Discipline Coordinator shall enter all checklists used in the discipline for which he is responsible in a Checklist Log (Attachment G).

5.4 Revisions and Supplements to Completed Checklists

Supplements to completed checklists shall be used to document any changes in findings based on the review of additional information including the review of later revisions to the documents being evaluated. Supplements shall use the same checklist forms originally used. They shall be completed in the same manner as the original checklists. However, only those attributes required to achieve the objectives of the supplementary review shall be completed and all others will be marked "NC". Upon approval, the checklist number assigned will be the same as the original checklist number with the additional indication of a supplement number. Supplement numbers will be assigned in sequential order beginning with 1. Supplements shall be entered in the Checklist Log as a separate line entry by the Discipline Coordinator.

Approved completed checklists and/or supplements may be changed by means of a Revision to correct errors associated with DAP implementation of the checklists or to provide additional information required by DAP procedures. Examples include the correction or addition of criteria numbers, HDA numbers, DIR numbers, misspellings and/or omissions. Revisions shall not be used to change any findings of the original review or to modify the context of the original review to reflect the review of later revisions to the documents being evaluated. A revision package shall include all of the same material contained in the original checklist package or supplement and shall be approved using the Design Review Evaluation Revision Cover Sheet (Attachment H). Revisions shall be initiated and checked by reviewers and approved by the Discipline Coordinator. The Discipline Coordinator may also sign as either the initiator or the checker. For checklists completed prior to 9/15/86, cover sheets shall be applied to the checklists if a revision or supplement becomes applicable. Previous "Rev. 0" checklists do not require a backfit. The original issue of completed checklists and/or supplements shall be noted as Rev. 0 with subsequent revisions assigned in sequential order beginning with 1.



ATTACHMENT A
COMANCHE PEAK
DESIGN CRITERIA REVIEW CHECKLIST

DSAP _____ CHECKLIST NUMBER _____

CRITERIA LIST NUMBER/REV _____

Review Topic Number(s)/Title(s) _____

List the Design Criteria Sources:

General Design Criteria _____

FSAR Section(s) _____

Regulatory Guide(s) _____

List Criteria Which Are Being Reviewed:

Criteria No.

Are the Design Criteria for this Design Topic Complete? _____

If "no," describe the missing design inputs. _____

Are the Identified Design Criteria for this Design Topic Consistent? _____

If "no," describe the inconsistencies. _____

Are the Design Criteria Adequately Defined to the Level of Detail Necessary to:

1. Allow the design activity to be carried out in a correct manner? Yes ____ No ____
2. Provide a basis for making design decisions and evaluating design changes?
Yes ____ No ____
3. Provide a basis for accomplishing design verification? Yes ____ No ____

If any of the above are answered "no" describe the lack of detail _____



Summarize Results of the Review. _____

Reviewer

Date

Discipline Coordinator

Date

ATTACHMENT B
COMANCHE PEAK
DESIGN REVIEW SUMMARY CHECKLIST

CHECKLIST NUMBER _____

DSAP Review Topic Number(s)/Title(s) _____

Documents Reviewed:

<u>Document Name</u>	<u>Number</u>	<u>Rev</u>	<u>Date</u>	<u>Safety-Related</u>	
				<u>Yes</u>	<u>No</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Description of Review Scope and Purpose. _____

List Design Criteria for this Review _____

Assumptions Listed for Each Document? Yes _____ No _____
Are the Assumptions Reasonable and Valid? Yes _____ No _____
Are the Assumptions Consistent with Design Criteria/Implementing Documents? Yes _____ No _____
Have all Assumptions which Require Verification Been Verified? Yes _____ No _____

Comments on Assumptions (Discuss Each "No" Answer Above)

ATTACHMENT D
ADDITIONAL CHECKLIST CONSIDERATIONS

1. Were the inputs correctly selected and incorporated into design?
2. Are assumptions necessary to perform the design activity adequately described and reasonable? Where necessary, are the assumptions identified for subsequent re-verifications when the detailed design activities are completed?
3. Are the appropriate quality and quality assurance requirements specified?
4. Are the applicable codes, standards, and regulatory requirements, including issue and addenda, properly identified and are their requirements for design met?
5. Have applicable construction and operating experience been considered?
6. Have the design interface requirements been satisfied?
7. Was an appropriate design method used?
8. Is the output reasonable compared to inputs?
9. Are the specified parts, equipment, and processes suitable for the required application?
10. Are the specified materials compatible with each other and the design environmental conditions to which the material will be exposed?
11. Have adequate maintenance features and requirements been specified?
12. Are accessibility and other design provisions adequate for performance of needed maintenance and repair?
13. Has adequate accessibility been provided to perform the in-service inspection expected to be required during the plant life?
14. Has the design properly considered radiation exposure to the public and plant personnel?
15. Are the acceptance criteria incorporated in the design documents sufficient to allow verification that design requirements have been satisfactorily accomplished.
16. Have adequate pre-operational and subsequent periodic test requirements been appropriately specified?

ATTACHMENT D

(continued)

17. Are adequate handling, storage, cleaning, and shipping requirements specified?
18. Are adequate identification requirements specified?
19. Are requirements for record preparation review, approval, retention, etc., adequately specified?

ATTACHMENT E

QUALITY ASSURANCE CHECKLIST CONSIDERATIONS

- o Are design analyses sufficiently detailed as to purpose method, assumptions, design input, references and units such that a person technically qualified in the subject can review and understand the analyses and verify the adequacy of the results without recourse to the originator?
- o Was a design review performed and documented?
- o Was the extent of design verification or review commensurate with the importance of the design to safety, its complexity, degree of standardization, relation to the state-of-the-art, and similarity with the previously proven designs?
- o Do appropriate design documents have review and approval signatures?
- o Were changes in designs (including field changes) justified? Were they subjected to design control measures (such as review and approval) commensurate with those applied to the original design?
- o Are the Design Criteria defined to the level of detail necessary:
 1. To allow the design activity to be carried out in a correct manner?
 2. To provide a basis for making design decisions and evaluating design changes?
 3. To provide a basis for accomplishing design verification?
- o Are assumptions listed?
- o Are assumptions reasonable and valid?
- o Are there assumptions which conflict with Design Criteria Implementing Documents?
- o Have assumptions which require verification been verified?

ATTACHMENT F

COMANCHE PEAK DESIGN ADEQUACY PROGRAM

DISCIPLINE/SUBJECT CODES

<u>Code</u>	<u>Discipline</u>
C/S	Civil/Structural
P	Piping and Supports
M	Mechanical
EIC	Electrical/Instrumentation
PGI	Programmatic/Generic Implications
E	Electrical*
I	Instrumentation*

*NOTE: Use of "E" and "I" codes are optional alternatives to the "EIC" code. EIC may be used for both Electrical and I&C. "E" may be used when the document is relevant only to the electrical discipline. "I" may be used when the document is relevant only to Instrumentation and Control.

ATTACHMENT H

DESIGN REVIEW EVALUATION REVISION
COVER SHEET

Checklist Number _____ Supplement No. _____, Rev. _____

Description of Revisions:



Initiated by: _____

Date: _____

Checked by: _____

Approved by: _____

TITLE REVIEW OF CALCULATIONS, EVALUATIONS AND OTHER IMPLEMENTING DOCUMENTS						
NUMBER DAP-5						
Revision	Prepared	Date	Reviewed	Date	Approved	Date
0	W. A. [Signature] for W. Henderson	8/30/85	[Signature]	9/13/85	[Signature]	10/4/85
1	[Signature]	1/6/86	[Signature]	1/8/86	[Signature]	1/15/86
2	[Signature]	6/20/86	[Signature]	6/23/86	[Signature]	6/23/86
3	[Signature]	9/10/86	[Signature]	9/10/86	[Signature]	9/12/86
CONTROLLED COPY NO. 61						

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COMANCHE PEAK RESPONSE TEAM - DESIGN ADEQUACY PROCEDURE

Number: DAP-5

Title: REVIEW OF CALCULATIONS,
EVALUATIONS AND OTHER
IMPLEMENTING DOCUMENTS

Revision: 3

1.0 PURPOSE

This procedure defines the methods for the review of calculations, evaluations, and other implementing documents.

2.0 SCOPE

This procedure applies to Review of Implementing Design Documents such as calculations and evaluations used in the design of the systems addressed by the Design Adequacy Program

Implementing documents will be reviewed against the appropriate design criteria. Calculations and evaluations will be reviewed for the adequacy of the applied methodology as well as accuracy of the implementation of the methodology.

This procedure does not address the review of output documents (drawings and specifications). The review of output documents is addressed in DAP-6.

3.0 DEFINITIONS AND RESPONSIBILITIES

3.1 Definitions

3.1.1 Implementing Documents

The documents which provide for implementation of the design criteria such as Flow Diagrams and Instrument Control Diagrams.

3.1.2 Criterion

A criterion is any statement of a performance, design feature, or design requirement which a system, structure, or component must meet in order to be

COMANCHE PEAK RESPONSE TEAM - DESIGN ADEQUACY PROCEDURE

Number: DAP-5

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capable of performing its design function or to be in compliance with a project requirement or commitment.

3.2 Responsibilities

3.2.1 Discipline Coordinator

The Discipline Coordinator is responsible for selecting the type and number of implementing documents, calculations, and evaluations in each area to be reviewed. The Discipline Coordinator is responsible for assigning Reviewers.

3.2.2 Reviewer

The Reviewer is responsible for completing reviews of assigned review topics in accordance with this procedure, using appropriate checklists, ensuring that the check is accurate, and checking that work done under his (or her) direction is correct.

3.2.3 Assigned Personnel

Assigned personnel perform verification activities under the direction of the Reviewer.

3.2.4 Checker

Checkers are responsible for verifying the accuracy of the Reviewers or Assigned Personnel's work.

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Title: REVIEW OF CALCULATIONS,
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4.0 INSTRUCTION

4.1 Identification of Reviewer

For each review topic listed in the description of the DAP self-initiated evaluation contained in the CPRT Program Plan, the appropriate Discipline Coordinator shall select an individual who shall function as the Reviewer for that topic and shall be responsible for the completion of the checklists associated with that topic (i.e., the Design Review Summary and Design Review Evaluation described in DAP 4 as Attachments B and C respectively or alternative checklists developed in accordance with DAP 4). The identified Reviewer shall meet the qualification requirements of DAP-15. The Discipline Coordinator may act as the Reviewer, provided that he meets the qualification requirements of DAP-15. Assigned personnel working under the direction of a Reviewer shall have been trained in this procedure and shall have received any technical training deemed appropriate by the Reviewer, but need not meet the qualification requirements applicable to the Reviewer. If the Reviewer determines that such technical training is necessary, the requirement of the training, its scope, and its completion shall be documented.

4.2 Customization of Checklist Forms and Identification of Specific Documents For Review

The Reviewer shall review the Design Review Evaluation checklist forms applicable to the review topic that have been released for use by the Discipline Coordinator. The Reviewer shall determine whether the forms require supplementation or other modification as provided for in DAP-4 (including the supplementary review items contained in Attachments D and E of DAP-4). He may make whatever changes he deems appropriate to customize the checklist form for a particular review topic.

COMANCHE PEAK RESPONSE TEAM - DESIGN ADEQUACY PROCEDURE

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For self-initiated review areas, documents shall be selected for review in accordance with DAP 21. Those specific items identified to be reviewed, shall be the latest revision of the applicable documents. If the applicable document revision has an approval date prior to April 1, 1985, it shall be used for review. Otherwise, the latest revision with an approval date prior to April 1, 1985 and all the following revisions shall be used as described in Section 4.4.



For overview of corrective action programs, the documents shall be the latest revision of the applicable document selected in accordance with DAP-20.

The Reviewer or Assigned Personnel under the direction of the Reviewer, shall enter the appropriate references for the selected documents in the "Reference" column of the checklist. The reference shall be sufficiently complete to allow another person to identify the specific portion of the document being reviewed. For example, the identification number and renewal pages of the calculation, as well as the calculation page revision number and date, should be used. The reference information may be entered into the checklist form in the course of the review.

4.3 Completion of Checklist

Each review of implementing documents shall be conducted by using the checklists developed in accordance with DAP-4 as customized in accordance with Section 4.2. The purpose of the review shall be to determine whether individual design documents appropriately comply with the applicable design criteria. The Reviewer or Assigned Personnel shall examine all items on the checklist and indicate whether each item was found to be satisfactory, unsatisfactory, not checked, or not applicable. "Not Checked" or "NC" may be used when a standard checklist form is used to perform a limited review of a given subject such that an applicable area was excluded from the review scope. "Not



COMANCHE PEAK RESPONSE TEAM - DESIGN ADEQUACY PROCEDURE

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Applicable" or "NA" may be used when an item on a standard checklist form is not applicable to the subject being reviewed. Where the appropriate use of "NA" or "NC" would not be apparent to a qualified reviewer, the use of "NA" or "NC" on the checklist should be accompanied by an explanation in the "Comments" column or as an attachment to the checklist which provides the basis for use of "NA" or "NC". Although not required, it is recommended that a reference be provided to the checklist(s) where the items marked "NC" are reviewed. The Reviewer or Assigned Personnel shall also indicate the basis for determining the verification conclusion (e.g., visual inspection of document, field walkdown, calculation review, and independent calculation) and the acceptance criteria (e.g., agreement with alternate calculations within X%, agreement between documents X and Y, etc.) if not otherwise included in the checklist form.

For self-initiated review areas, completed checklists shall indicate the homogeneous design activity (HDA) number associated with each checklist item (attribute). This can be accomplished by indicating the HDA number in the "Comments" column or on an attachment that clearly establishes the correlation. This is not required for checklists used for overview of corrective action programs.

The "Comments" column may also be used for any other comments about an attribute, its implementation, or its verification.

4.4 Current Document Revisions After March 31, 1985

This section only applies to self-initiated review scopes.

As noted above, special review considerations are applicable to documents for which the current revision of the document is dated later than March 31, 1985.



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In such cases the following steps shall be completed by the Reviewer or Assigned Personnel:

- o The last revision prior to April 1, 1985, shall be obtained.
- o All revisions between the revision obtained in the previous step and the current revision shall be identified and obtained.
- o The Reviewer or Assigned Personnel shall determine the differences among the revisions and the causes for those revisions.
- o A review shall be conducted using the current revision of the document and the appropriate design review evaluation checklist completed.
- o Appropriate design review evaluation checklists shall be completed to document the review against the review attributes of those aspects of the revision of the documents that were changed in the latest revision. The "Sat/Unsat/NA/NC" column shall be marked as appropriate. Items that are "Unsat" in the previous revisions shall be processed in accordance with 4.5 (below) in spite of any correction that may have been made in the current revision.

4.5 Processing Unsatisfactory Items

Items found to be unsatisfactory shall be noted on the checklist and shall also be separately compiled and processed in accordance with the procedures outlined in DAP-2. The DIR number assigned to each unsatisfactory item shall be listed in the "Comments" column, or as an attachment to the completed checklist with suitable traceability to each unsatisfactory item.

4.6 Approval

If the checklist is completed by Assigned Personnel, the "Comments" column

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shall be annotated with the name or initials of the person who performed the verification. The Reviewer shall assure himself of the adequacy of the completed checklist and sign the "Reviewer" space.

After a checklist is completed and signed by the Reviewer, the Discipline Coordinator shall designate a Checker.

The Checker shall verify the accuracy of the checklist by reviewing at least 10 percent of the checklist items or a minimum of 5 items. After all comments or questions are resolved with the Reviewer, the Checker shall sign the checklist in the "Checker" space and return it to the Discipline Coordinator. The checklist shall be approved by the Discipline Coordinator, who shall sign the "Approved By" line of the checklist sheet. If the Discipline Coordinator is also the Reviewer he shall sign both spaces.

5.0 DOCUMENTATION

Upon approval, checklist identification numbers are assigned in accordance with Section 5.3 of DAP-4. Each completed checklist shall be forwarded to the DAP Manager for filing in accordance with DAP-14.



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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
before the
ATOMIC SAFETY AND LICENSING BOARD

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

_____)	
In the Matter of)	Docket Nos. 50-445-OL
TEXAS UTILITIES GENERATING)	50-446-OL
COMPANY et al.)	
(Comanche Peak Steam Electric)	(Application for an
Station, Units 1 and 2))	Operating License)
_____)	

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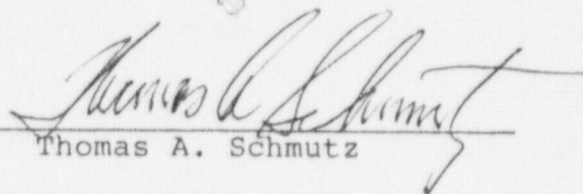
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