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NUCLEAR REGULATORY COMMISSION

IN THE MATTER OF:

CYGNA BRIEFING TO NRC MANAGEMENT
ON COMANCHE PEAK STEAM ELECTRIC
STATION INDEPENDENT ASSESSMENT
PROGRAM

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UNITED STATES OF AMERICA

NUCLEAR REGULATORY COMMISSION

CYGNA BRIEFING TO NRC MANAGEMENT

ON COMANCHE PEAK STEAM ELECTRIC STATION

INDEPENDENT ASSESSMENT PROGRAM

Nuclear Regulatory Commission
7920 Norfolk Avenue
Room P-118
Bethesda, Maryland

Friday, April 26, 1985

The meeting convened at 1:15 p.m., Darrell Eisenhut presiding.

ATTENDEES:

VINCE NOONAN	NRR/NRC
CHARLES TRAMMELL	NRR/NRC
DARRELL EISENHUT	NRR/NRC
JOSE A. CALVO	NRR/NRC
DONALD NORKIN	IE/NRC
E. C. MARINOS	NRR/NRC
E. B. TOMLINSON	NRR/NRC
J. L. KNOX	NRR/NRC
E. L. JORDAN	IE/NRC
J. H. SNIEZEK	NRC (Part-time)
R. H. VOLLMER	NRC/IE
A. THADANI	NRC/NRR
R. J. BOSNAK	NRC/NRR/DE
L. C. SHAO	NRC/RES
S. H. BUSH	Riemen & Synzhasu
N. H. WILLIAMS	CYGNA
R. J. STUART	CYGNA
M. N. SHULMAN	CYGNA
R. E. NICKELL	CYGNA Consultant
JACK REDDING	TUGCO
JOHN BECK	TUGCO
FRANK SHANTS	TUGCO
ANNETTE L. VIETTI	NRC/NRR/DL
MARK NOZETTE	Heron, Burchette, Ruckert & Rothwell
SUSAN BRENNA	Dallas Times Herald
VICTOR FERRARINI	EAS/TRT Member
ROY LESSY	Morgan, Lewis & Bockius
JACK SPRAUL	IE/NRC
DAVID TERAO	NRC/NRR/MEB

-- continued --

ATTENDEES (Continued):

KATHLEEN WELCH	CASE/V. S. Pirg
HENRY W. MENTEL	Gibbs & Hill, Inc.
TONY ROISMAN	TLPJ
JIM LANDERS	Dallas Morning News
SPOTTSWOOD B. BURWELL	NRC/NRR
W. P. CHEN	ETEC
GEARY S. MIZUNO	NRC/OELD
JOE YOUNGBLOOD	NRC/NRR/DL
CHARLES J. HAUGHNEY	COMEX (NRC Contractor)
R. K. GAD III	Ropes & Gray
JOHN GUIBERT	TERA Corporation

1 P R O C E E D I N G S

2 MR. EISENHUT: Let me start off. I am Darrell
3 Eisenhut with the NRR staff. On this project, I guess
4 it's been a couple of years now Cygna has been doing an
5 evaluation for the Comanche Peak project. When we
6 conceived the idea to have Cygna come in originally, it
7 was to give a management overview of what has been going
8 on, what work has been done, what has been found, what
9 conclusions are there, to try to put things in perspective
10 as a framework; and I really looked at it as a framework,
11 from where we can go forth and continue to do our review.
12 So today we are going to hear from Cygna to make this
13 presentation. The staff, quite a bit of the staff members
14 supporting the Comanche Peak project are here, including
15 Vince Noonan, of course, who heads the project. We are
16 keeping a transcribed meeting today, so just as a way of
17 formality, Vince, I am going to ask everyone to identify
18 themselves as we go through.
19 This will provide a record for us to go forth from for
20 us to be able to decide what kind of review we need to
21 undertake in a great measure; as I said earlier, to sort
22 of set the framework: What you have been doing, what has
23 been found and, as important as anything else, where are
24 you going in the longer haul? When do you see your
25 charter has been accomplished? Not that I am trying to

1 discontinue it at any point, but when do you see that you
2 are at the point where you reached the conclusions that
3 you think are at the end of the line? That's basically
4 the purpose as we see it here.
5 Vince, I turn it over to you if you plan to have any
6 introductions or whatever.
7 MR. NOONAN: I don't think I will go into any
8 real introductions. I want to make sure everybody is
9 aware that the meeting is transcribed, and please identify
10 yourself so the reporter has your name and what
11 organization you are with.
12 At the end of the meeting, we will offer comments by
13 representatives of CASE and also representatives of the
14 applicant. With that, why don't you go ahead.
15 MR. EISENHUT: Let me qualify those really in
16 the mode of commenting on it. I don't want this to be one
17 of the meetings where we get in a technical dialogue. We
18 are really here to understand what you have been doing for
19 the last -- some time, and what have you concluded and
20 where you are heading. So with that I will turn it over
21 to Dick Stuart.
22 MR. STUART: We have got 40 or 50 transparencies
23 which really describe the scope of our study, as well as
24 describe some of our results in an overview form. For
25 those of you that didn't receive them, there are booklets

1 around that are identical to the transparencies. The
2 presentation will be given today by myself -- I am
3 president of Cygna; by Nancy Williams, who is the project
4 manager and has been on the project -- has been the
5 project manager on this independent design assessment
6 program since April of 1983; by Mike Shulman, who is
7 general manager of Cygna, and also the chairman of the
8 independent review team.
9 We also have the independent or senior review team here,
10 Bob Nickell and Spence Bush, and they can comment as well
11 on the overall program.
12 We are going to go through today our scope, objectives
13 and methodology, our review results, and then some
14 comments from the senior review team about some of the key
15 items.
16 In terms of what the Independent Assessment Program
17 scope really is, it's a combination; it's more than just a
18 management review. I will get into chronologically how
19 that came about in a few minutes. It's a multi-disciplined
20 technical review of several systems. It's an as-built
21 verification program, again, of several systems. It gets
22 quite heavily into piping and pipe support issues; then
23 there really are -- it's a look at design control, which I
24 say is a management overview, and specifically was a
25 review of Texas Utilities and Gibbs & Hill.

1 Finally, we look at really the implementation of the
2 programmatic documents that really control the design
3 process.
4 Breaking that down, further, in more detail, and also
5 breaking it down into the various phases, the program is
6 divided into four phases: Phase 1 was, in fact -- and
7 Phase 2, were encouraged by the NRC. Phase 1 really
8 started off as an added assurance program and Phase 2 was
9 really an adequacy program dealing with technical issues.
10 Now, added assurance, if you look really at the issues
11 that were looked at, was primarily in the design control
12 area. So it's really looking at the process of design, as
13 opposed to getting into the design details.
14 Phase 2 was starting to look into design details, but
15 more from an adequacy point of view.
16 A translation of what that really means is that if
17 issues were found, they were determined by the experience
18 of the reviewers as to whether, in fact, there would be
19 significant safety impact of those issues. If there was
20 not significant safety issues, then the team did not
21 define a discrepancy of any type.
22 Phase 3 and Phase 4 were motivated principally by ASLB
23 concerns and questions, and were much more extensive and
24 much greater depth into the various review areas.
25 Phase 4 and into the future is continuing to look into

1 those areas where we see problems, it's reviewing some of
2 the corrective action that Texas Utilities are proposing,
3 and it's looking at the cumulative effects of several of
4 these issues when one looks at them overall, from a
5 systems point of view.
6 MR. NOONAN: Dick?
7 MR. STUART: Yes.
8 MR. NOONAN: I wondered if when you talk about
9 the experience level of the people in this review, could
10 you kind of expand on this a little bit, tell us some of
11 their backgrounds; just briefly touch on their backgrounds
12 and experience level.
13 MR. STUART: I would say the people that worked
14 on this range from Ph.D.s with 20 years experience,
15 probably down to engineers with bachelor's degree with
16 five years experience. I don't believe we have used any
17 technicians on the program at all. And of course it's
18 supported by clerks who do some of the paperwork and
19 documentation.
20 They are drawn from our staff, which is 350 people, and
21 drawn from our experience base, which is roughly 10 years
22 in the nuclear business.
23 These people all have been production pipe designers,
24 production electrical designers and engineers, and
25 production pipe support designers.

1 So basically they worked in various organizations,
2 including our own, that have had these types of scopes
3 within this industry.
4 Then we have supporting them senior people as needed;
5 in some cases some consultants, senior review team members,
6 et cetera.
7 MR. NOONAN: Okay.
8 MR. STUART: Does that answer it, Vince?
9 MR. NOONAN: That's fine.
10 MR. STUART: I want to make a comparison of this
11 review with several others that are both qualitative and
12 quantitative in viewpoint, because Texas Utilities' view
13 is quite different than several of the others.
14 We did a review which covered primarily Phase 1 on
15 Grand Gulf with about 3800 hours expended, and these --
16 really, all three of these are more in the area of added
17 assurance or adequacy. In other words, not really going
18 extremely deep down into the technical compliance with the
19 ASME code, et cetera, but rather looking at it from an
20 experience point of view and reconfirming, where we looked
21 at Phase 1 and Phase 2 completely and very little in the
22 equivalent of Phase 3 or 4. And then last at Perry, where
23 there was a very, very small review done primarily in
24 Phase 2 in adequacy.
25 I might add there's another variance that appears in

1 Grand Gulf. We expended 3800 hours, and Perry we looked
2 at three systems with 3400 hours. The main point I would
3 like to make is Comanche Peak is 47,858 hours through
4 April of this year; it goes into much, much greater depth.
5 That depth primarily occurs in Phases 3 and 4. Phase 1
6 and 2 are quote comparable in scope to where you see 100
7 percent on this chart.
8 In terms of the disciplines and how they break down in
9 our review, it's like maybe a little difficult to read, so
10 I will just point out some of the larger numbers. The
11 largest percent of that 47,000 hours is 29 percent pipe
12 supports, 24 percent in cable tray and conduit supports,
13 17 percent in design control, 10 percent in pipe stress,
14 and the numbers fall off dramatically from there.
15 I would like to point out that if you look at seismic
16 equipment qualification with 1 percent, electrical with 4
17 percent, mechanical systems with 2 percent, one might say
18 that those reviews, why was the percentage so low? There
19 are two reasons: The systems that were selected are not
20 highly complex from either an electrical or mechanical
21 point of view, point 1; and, secondly, in the reviews that
22 we did, we found good compliance. There were very few
23 problems that we discovered. So from those two points of
24 view, it caused us not to increase our depth further in
25 those areas.

1 Q This is a flow chart of the independent
2 assessment program. For those without booklets, I will
3 read the boxes so you understand. The first is the
4 collection of the documents; the second is development of
5 the review criteria and check lists; third, a review.
6 When a discrepancy is found, it is determined whether it
7 is a problem or not. If it's not a problem, it comes down
8 the side here and goes into the final report.
9 If it is a problem, the review team continues to look
10 [illegible] ther to determine a difference between a discrepancy or
11 one with potential design impact. Now, if you follow this
12 flow chart through, you can see that in these triangles,
13 it points out the problem areas and increasing severity.
14 Discrepancy, potential design impact, a valid observation,
15 which goes into the report, as such, the final report as
16 such. A potential finding and then as a definite
17 potential finding. These are sort of buzzwords that are
18 really used to subdivide the severity of the concern or
19 observation.
20 MR. THADANI: I am Ashook Thadani from NRR. Can
21 you tell us a little bit more about what you mean by
22 potential safety impact?
23 MR. STUART: Nancy, do you want to define that?
24 MS. WILLIAMS: The "definite potential finding,"
25 as we call it, is determined at that time to require and

1 report it to both Texas Utilities and the NRC. We don't
2 do the part 21 evaluation, because we don't have all of
3 the information that would have to be done by the utility
4 or the 5055 E. We have one set finding in all four phases.
5 MR. THADANI: So it really does not relate
6 necessarily to a big safety problem, but rather perhaps
7 ASME code requires certain things and there's a violation
8 of whatever the requirement might be in the ASME code and
9 so on. That's how you are using the words "safety impact"?
10 MS. WILLIAMS: Safety impact, yes. We are
11 making a judgment as to whether there is any potential
12 that the error or discrepancy would cause the component
13 not to function or something along those lines.
14 But you could have a violation of the code and still
15 not impact the functionality of the component.
16 MR. THADANI: Are you making that judgment on
17 functionality?
18 MS. WILLIAMS: You do have to make that judgment,
19 yes. It's all documented.
20 MR. THADANI: Thank you.
21 MR. STUART: I might add that you sort of really
22 pointed out the difference between an adequacy review in
23 our Phase 3 and 4 review where from an adequacy point of
24 view there might be a minor discrepancy in the ASME code,
25 the system is determined to be functional and safe.

1 I might add there are several points along this flow
2 chart where the senior review team is brought into the
3 process here after a potential design impact is discovered.
4 Senior review team is brought in here, after a potential
5 finding, and it is brought in here at the end of the
6 review of the final report.
7 MR. SHAO: Dick, can you explain in more detail
8 how you do the review? You do independent calculations or
9 you check their calculations?
10 MR. STUART: Let me go back, Larry, two slides,
11 and show you what that looks like. The answer to your
12 question is it depends what on this chart we are doing.
13 And in Phase 2, we would check their calculations; and
14 Phase 1, we would check their design process to make sure
15 their design documents were checked. And Phase 3 and
16 Phase 4, we run independent evaluations in areas where
17 there's not enough detail provided. If we think that
18 there is a potential concern, we will actually run check a
19 stress analysis.
20 MR. SHAO: When you say "independent," what do
21 you mean by independent calculation?
22 MR. STUART: In addition to reviewing their
23 calculations -- Gibbs & Hill, as an example -- we would
24 run a separate calculation on our own, on our side.
25 MR. SHAO: Starting from scratch?

1 MR. STUART: Yes, starting from scratch. That's
2 only done, however, in Phases 3 and 4, in the technical
3 portion of the review.
4 This is -- as I mentioned earlier, this is our senior
5 review team. One of the members who has acted on the
6 senior review team is no longer active, and that's Bob
7 Kennedy, but Dr. Bush and Dr. Nickell are here today, and
8 Mike Shulman is going to discuss the senior review team,
9 how it functions, what type of guidance they provide to
10 this process, as well as the qualifications of the
11 individuals on the team. At this point I would like to
12 turn the presentation over to Nancy Williams, who will get
13 into the scope, objectives and methodology results.
14 MS. WILLIAMS: I am going to start with an
15 overview, as Steve said, the scope, methodology and
16 objectives of each Phase 3 review. I will cover what the
17 hardware scope is, and I will give you a little more
18 detail on the programmatic reviews and implementation
19 reviews and just what is involved with that.
20 As Dick mentioned, we have programmatic reviews and
21 implementation reviews. When we speak of programmatic
22 reviews we are speaking of the compliance of Texas
23 Utilities or Gibbs & Hill program with ANSI N45.2.11,
24 which is design control or the implementing document for
25 appendix B, criterion 3.

1 I am going to begin with design control for all phases,
2 and then I will break the technical review scope down by
3 phase for you.
4 This diagram is intended to point out pictorially the
5 various elements of the ANSI N45.2.11 evaluation involved.
6 The entire contents of all of our program deals with
7 design, which is a key point because when we get down into
8 talking about criteria I and XVI for appendix B, we did
9 not cover testing and all the other portions of the
10 program which would come under the auspices of criterion I
11 and XVI or corrective action for testing or construction,
12 but we did it all for design.
13 So through the evolution of the program, we did check
14 that Texas Utilities and Gibbs & Hill had the necessary
15 controls in place to fulfill the requirements of criterion
16 III.
17 We later on checked Gibbs & Hill. TUGCO, NPSI and
18 Grinnell had programs in place that complied with the
19 requirements for organizational independence, which is
20 criterion 1, and corrective action as it pertains to
21 design, which is criterion XVI.
22 After having looked at these programs, the next thing
23 we do is take the procedures and do a check to determine
24 how well they are following the procedures. So first we
25 evaluate the commitments and then we check how well they

1 fulfill the commitments.

2 The criterion I and XVI reviews were a little unique in
3 that we also did a historical review, so we have
4 information as to whether the design organizations were
5 historically independent and met the requirements through
6 time.

7 Criterion III we did as it exists today, as it existed
8 during the time frame of the design that we were reviewing.

9 So if you take criterion III, you will see that we
10 reviewed five elements. There are really, if you take
11 that document, 10 elements. And we did a partial review
12 of the ANSI N 45.2.11 requirements, those being design
13 analysis control, design interface and design change
14 control for phases 1 and 2. We then added on design input
15 control and design verification control in Phase 4.

16 That covers the programmatic and design control aspects
17 of our review.

18 Now going into the objectives for each phase, and then
19 I will follow with a technical review scope for each phase,
20 begin with phases 1 and 2, where, as Dick explained, we
21 were trying to provide added assurance by assessing design
22 adequacy of a portion of the RHR system. We provided an
23 assessment of the design control program, which I just
24 spoke of, and we evaluated the implementation of certain
25 portions of the design control program, which I just spoke

1 of.

2 We considered the technical reviews and implementation
3 evaluation comparable to the implementation evaluation on
4 the design control side in that we are checking how well
5 they execute the design, how well they implement the
6 design criteria and how well they implement their FSAR
7 commitments.

8 So in order to execute and meet our objectives for
9 Phase 1 and 2, the RHR safety injection system, train B
10 was selected, and we did a multi-discipline review of the
11 pipe stress, which included two stress analysis problems.
12 We reviewed the pipe support design, which included 31
13 pipe supports. We reviewed the cable tray support design
14 which consisted of, I believe, approximately 30 cable tray
15 supports. We reviewed the electrical power supply to the
16 RHR pump and the instrument controls to the motor-operated
17 valve located in that run of pipe.

18 We then reviewed the seismic equipment qualification
19 for one valve.

20 In addition, the spent fuel pool system was selected.
21 It was actually the Phase 1 selection for review scope, to
22 perform the walkdowns on. The reason that one was
23 selected was because it was the only completed and turned
24 over system at the time of our review.

25 In that case we performed again a multi-discipline

1 walkdown and we assessed the implementation of two design
2 control elements.
3 We used the documents associated from the technical
4 reviews to check the implementation on the design control
5 side, which is why you see design control elements
6 associated with specific hardware.
7 This slide summarizes the breakdown for Phase 1 and 2
8 and man-hours for each of the disciplines.
9 As you can see, there is heavy concentration on design
10 control in phases 1 and 2, that's box number 2 on this
11 slide.
12 Phase 3 was added sometime around March of 1984, it was
13 put together to address some of the concerns that had been
14 raised through the hearing process. It was decided that
15 we would again assess the adequacy of the piping and pipe
16 supports, and we would assess the corrective action and
17 organizational aspects of the design control program.
18 In order to do that the CCW or component cooling water
19 system and main steam systems were selected. The design
20 of piping and pipe supports only consisted of 9 stress
21 problems and 131 pipe supports associated with those runs
22 of pipe.
23 In the design control area, again, organization and
24 corrective action as they pertain to design.
25 MR. NOONAN: Nancy, I wonder if you could go

1 into a little bit more depth as to why these systems were
2 selected. Concerns of the staff, ASLB, how did you get
3 that?
4 MS. WILLIAMS: Okay. In March of 1984, TUGCO
5 prepared a plan in response to the December, 1983,
6 memorandum and order from the hearing board.
7 As part of this plan, they wanted to address the
8 allegations that had been made in the piping and pipe
9 support area, and I believe they, Texas Utilities, had a
10 consultant sit down and select those systems which
11 exhibited the most number of characteristics which were
12 involved in the litigation. So they wanted to have two
13 systems that we would see examples of the problems that
14 were being discussed in the hearing process.
15 We were not given a list of what those problems were.
16 We truly went in in the independent sense, looked at the
17 systems and gave an opinion as to not the adequacy in this
18 case, but the letter of the law, when it comes down to
19 meeting code requirements.
20 MR. NOONAN: I think the question has been asked
21 before in previous meetings we had with you, about the
22 Walsh/Doyle concerns. Do you now have knowledge of those
23 concerns?
24 MS. WILLIAMS: There were a couple we didn't
25 have, such as upper lateral strength, such as the

1 Walsh/Doyle, that we would not have been looking at as
2 part of this program, but I think we have a pretty good
3 handle on what all the piping and pipe support issues are.
4 I believe there have been maybe one other issue that we
5 didn't see an example of. But for the most part this is a
6 presentation available from December 20 of '84 where we
7 discuss what those are and summarize them by group and by
8 category and give a summary for the basis of either
9 resolution or further review on our part.
10 MR. NOONAN: Okay.
11 MS. WILLIAMS: This is the man-hour distribution
12 for Phase 3. As you can see, there is a lot more time
13 spent on the pipe support than stress analysis. That's
14 due to the sheer number of pipe supports, 131, and the
15 number of findings and the extent to which we had to
16 investigate the implications of some of the findings.
17 In the pipe stress area, we found some significant
18 deviations or problems, but once you find it in one stress
19 problem, it becomes very repetitive to the other stress
20 problem, so it doesn't require quite the man-hours as
21 individual pipe supports do.
22 Phase 4 was added after Phase 3 started. TUGCO
23 submitted a revision to their plan to the hearing board,
24 and as part of that plan, they committed to a
25 multi-discipline review; and around May of 1984, we

1 submitted our plan to address that portion of TUGCO's
2 actions that they had committed to and added on a
3 multi-discipline review of the same disciplines,
4 essentially, that we had done in Phase 2, only much, much
5 greater depth.
6 We evaluated the implementation of design input and
7 design verification control systems; and some aspects is
8 still going on, and I will cover that when I get to the
9 end of the scope description.
10 Both Phases 3 and 4 still have open items at this point
11 in time.
12 MR. NOONAN: Are you going to address the
13 schedule, a little bit, as to when Phase 4 comes to an end?
14 MS. WILLIAMS: Yes.
15 MR. NOONAN: As far as your overall work is
16 concerned.
17 MS. WILLIAMS: The implementations for Phase 4
18 were done on component cooling water system and main steam
19 design. We did a design review and checked the two design
20 control elements, performed an as-built walkdown and we
21 assessed the process, really, from start to finish. We
22 had one system where we took it from design through
23 drawings and into the field. Whereas in Phase 1 and 2 we
24 did design on one system and we did walkdowns on another
25 system. So although you are looking at both ends of the

1 process, you are not really seeing it all together. So
2 this is our first look in depth at the whole thing
3 straight through.
4 Finally, the man-hour distribution for Phase 4, and now
5 the biggest portion is the cable tray and conduit supports
6 to which numerous items are identified to date, and we are
7 still pursuing various aspects of that.
8 MR. SHAO: Which organization did cable tray and
9 conduit support?
10 MS. WILLIAMS: Gibbs & Hill.
11 MR. SHAO: Is it a structure group or piping
12 group?
13 MS. WILLIAMS: It's a structural group. It's
14 different from the piping group.
15 Let me correct one thing on this slide as well: There
16 were no programmatic reviews in Phase 4. We only did
17 implementation, so this slide, pieces of the pie 1 and 2
18 really are implementation of the design control and not
19 programmatic.
20 Well, now that we have looked through all four phases,
21 and we sit now with findings from all four phases, we sat
22 back and said, well, what are we going to do with all this
23 data? And within about the last month and a half, I have
24 started a process to try and integrate all four phases
25 worth of findings. I have taken the raw data and put it

1 into a data base, which is not yet done.

2 But the idea there is that I will be able to trend the

3 results through organization: Every time information is

4 transferred from one organization to another, are we

5 seeing a problem, or is it always one group within the

6 architect engineer who is having problems, or is it one

7 type of design process that seems not to have sufficient

8 control, or any trends, both across organization and

9 within disciplines? And it covers everything that was a

10 discrepancy in our checklist on through everything that

11 was a definite potential finding, a very comprehensive and

12 it's a fairly large undertaking to get it together. But

13 we will be able to sort out about six different attributes

14 including root cause and look for tracks.

15 Now parallel to that, I have developed design process

16 flow charts for each of the disciplines and then matched

17 the corresponding procedures for these flow charts. And

18 the idea is that once I get the trends from the data base,

19 I can compare those results to the way in which the work

20 is supposed to flow, and look at the procedures which

21 govern that flow of work and make a determination as to

22 whether there are any weaknesses as well as strengths in

23 the process that has been set up for the Comanche Peak

24 project.

25 MR. SHAO: Are you ready to discuss some of the

1 root causes today or not?

2 MS. WILLIAMS: It's a little premature. I know

3 what the various root causes are, but I haven't sat back

4 and looked at it in terms of what is the most important

5 root cause. I can't single any out quite yet.

6 I would say we're probably about a month away from

7 having this whole thing really operational and ready to

8 talk about.

9 MR. NOONAN: Maybe what I would like to do at

10 this point in time, yesterday we noticed a public meeting

11 that will take place on the 8th of May, where we will sit

12 with the applicant and go through his program plan for the

13 design issues.

14 We are asking Cygna to come in and participate. It's

15 going to be a working session, where we get down into some

16 of the more technical details of these things, and staff

17 will be setting and asking a lot of detailed questions,

18 and what I call a real working session.

19 At that point in time, can you discuss root causes with

20 us?

21 I don't want to do it if you are not ready, I want to

22 make that clear, but I am looking to see if you will be

23 prepared to do that.

24 MS. WILLIAMS: I think in selected instances you

25 can do it, but I can't talk to the trends. I can't talk

1 to what the major root cause is.

2 MR. SHAO: But to me you have to know the root

3 cause first, then you can action plan.

4 MS. WILLIAMS: I can't speak to any individual

5 root causes for any finding.

6 MR. STUART: I think there is a misnomer going

7 on in here. We have in the next 10 slides a list of what

8 we perceive as being the generic issues on the Comanche

9 Peak review.

10 MR. SHAO: Right.

11 MR. STUART: When Nancy is speaking about root

12 cause, she is talking about the root causes of cumulative

13 effects. So there's two different issues on the table,

14 and it's the one, it's the root cause of cumulative

15 effects that we are going to have to delay a month to

16 review. But all of the technical generic issues are

17 summarized in today's slides.

18 MR. SHAO: Let's say for participation, the

19 question is what is causing this, what happened that this

20 happened.

21 MR. STUART: That's what we have not completely

22 traced through, Larry. We certainly know mass

23 participation is a problem. You will see it on the slide.

24 MR. SHAO: I know; but the problem is in order

25 to resolve the problem, you have to know why it has

1 happened, whether some engineer goofed or maybe the
2 organization goofed.
3 MS. WILLIAMS: Well, that is exactly what this
4 process is going to tell me. I know what I think the root
5 cause for mass participation is today. But I could very
6 well find out that there is a much larger problem with the
7 training of the engineers or the adequacy of their design
8 criteria that they are using in that group. Then that's
9 when I need to stand back and look at all the errors that
10 came out of that group and assess whether it indicates the
11 level of expertise, the adequacy of their controlling
12 documents, their criteria, and along those lines. So I
13 say on an isolated basis, I can tell you what I think they
14 are, but that's not necessarily how it's going to hold up
15 when I put the whole picture together.
16 MR. STUART: We are somewhat like the NRC, Larry,
17 in that we might look at something and a year later come
18 up with an SER. Well, ANSI we have been looking at quite
19 a while, but our SER is coming out in a month or so on
20 root cause issues. We have lots of ideas. I am sure in a
21 working group session we could sit down and discuss what
22 we have discovered so far, but we really don't have the
23 final conclusions yet, much like you can't issue an
24 official position until you issue your SER.
25 MR. CALVO: Larry Calvo from the NRC. You just

1 said now in response to Larry's question, you said that
2 you concentrated on the design control process. Do you go
3 any farther than that, are you making any group
4 conclusions, insofar as the terms of the adequacy of the
5 design? It looks to me like you draw some samples of the
6 design control process. How about adequacy, you also have
7 root causes of that?
8 MS. WILLIAMS: Yes, we are. That's all part of
9 that. That I have already done -- well, I know
10 individually what the impact of each problem is. But
11 cumulatively is what I am still working on.
12 So, for example, you will see when I get the result
13 section that there are five pipe stress analysis problems
14 that would affect the loads and the supports, so you have
15 to look at those together. That's what we are still doing.
16 In fact some of this will be wrapped up, I believe, in
17 TUGCO's plan as well.
18 MR. CALVO: Are you going to extrapolate from
19 the fact you have some problems of a certain nature with
20 the pipe support, you had similar problems in the
21 electrical, instrumentational mechanical disciplines? You
22 have not yet made that cross?
23 MS. WILLIAMS: Exactly. Not every group does
24 their business the same way. Just because there's
25 problems in the pipe stress analysis does not necessarily

1 indicate there are problems in the electrical area. I am
2 trying to dissect that by having a logical, well laid out
3 process, so that you can look at it and say, "Okay, I
4 understand what Cygna's logic was going through this; I
5 can see how they have narrowed the problem down to certain
6 groups or certain disciplines or certain types of
7 designs" and that kind of thing, because it's very
8 unwieldy to get your hands around all of the findings at
9 this point in time.
10 MR. NOONAN: Before you go any farther, Dick, in
11 the section here, you are going to make the conclusions.
12 I wonder if you could address in those conclusions, for us,
13 the independence issue, how you maintain the independence,
14 the protocol, those kinds of things, communications with
15 the utility, with the NRC.
16 MR. STUART: Okay.
17 MS. WILLIAMS: Also, in addition to this, there
18 are really two outstanding questions, one of them
19 remaining all the way back from Phase 1.
20 Thus, we had a finding that the document control center
21 was not functioning very efficiently in some cases until
22 they implemented their new satellite system, which was
23 about a year ago. The obvious question is what impact
24 does that have on the designs that are complete and
25 installed.

1 There is really no easy answer to that. But what I
2 think I can do with the data is go through and determine
3 to what extent any of our findings could be attributable
4 to an inefficiency in that process.
5 So we are going to be looking towards that, anyway.
6 MR. CALVO: Do you feel, at this time, that you
7 have done enough of the review, your scope was big enough,
8 so that you can come up with some of those conclusions
9 about the quality of the design, or do you think there may
10 have been some areas you have been limited?
11 MS. WILLIAMS: In some areas it's more limited.
12 For example, pipe stress I feel very comfortable with,
13 because we have looked at a lot of problems and we have
14 gotten to the point of seeing reoccuring errors. So I
15 have a pretty good feel for the pipe stress, pretty good
16 feel for the pipe supports by sheer number of supports and
17 having looked at a lot of different types. Cable trays is
18 very extensive too. You can tell from our pie charts on
19 the man-hour distributions that they were just not that
20 heavily emphasized.
21 MR. STUART: Once again, the scope, we were
22 never really involved, too much, in the selection of the
23 individual systems.
24 Rather, we were asked, will this system be
25 representative from your point of view to look at some of

1 the issues, and we would say "yes."

2 I think the systems were negotiated between the NRC and

3 TUGCO in terms of what would be an acceptable system for

4 the review.

5 Now, in retrospect one might go back and say, looking

6 at one valve for seismic equipment qualification, it's

7 certainly not a representative sample of the plant, and

8 that's all we have looked at in our scope.

9 Likewise, the particular systems that we looked at were

10 not very complex in electrical and mechanical.

11 So there may be -- you know, someone may take a look at

12 those systems and say, gee, we should look at some more

13 complex systems in greater depth and those areas. That

14 would be a determination between TUGCO and the NRC.

15 MR. CALVO: Excuse me, but you also can conclude

16 that based on what you have done that you don't have

17 sufficient bases to just go across the different systems.

18 You have not done enough in the electrical, I don't see

19 how you can conclude what the quality of the electrical

20 conclusion is by looking at one valve or one motor. Also

21 your pipe support may not be the same as electrical. You

22 will find in some disciplines you do not have enough bases

23 to come out with a conclusion.

24 MR. STUART: I don't think we can find that one

25 valve is a representative sample. That's absolutely true.

1 The electrical view that we took, I think, was quite
2 thorough, but broad, and because of the breadth of the
3 review and because we had no findings, we didn't search
4 deeper into the electrical area. In our view, that was
5 adequate for the systems that we looked at. I am sure
6 there are much more complex systems electrically where one
7 would need to take a much deeper review.
8 So I think you are correct that I would be careful to
9 try to extrapolate looking at systems that were not very
10 complex electrically and mechanically for the entire plant.
11 MS. WILLIAMS: One more point on that. When I
12 am describing this process that I am going through, it is
13 certainly within our scope. It will be very well defined
14 in that regard. We are not doing this matrix for the
15 whole plant, but we are doing it to try to assimilate the
16 results that we have through two years of reviews.
17 The last area that is still somewhat open, although we
18 did a corrective action system implementation in Phase 3,
19 I also want to stand back and look at all of the technical
20 findings from all phases and view them in the light of
21 whether the corrective action system should have picked
22 them up or not.
23 That completes the overview of the scope and generally
24 the extent of our reviews, for the most part.
25 We did look at the existing calculations, and as

1 previously pointed out we also did some parallel
2 calculations for those areas where we may have disagreed
3 with the approach or there was insufficient information.
4 Now I am going to cover the review results for each of
5 the disciplines.
6 I am going to do it in an overview sense. I will tell
7 you what the major generic items are. I was not intending
8 to go into a lot of depth in them, but stop me if there is
9 a particular one you want to talk about.
10 In the area of pipe stress, we have narrowed it down to
11 two generic issues. One of them is mass participation
12 where we have had hours and hours of lengthy discussions
13 as to all the implications of that; our feelings on the
14 implications are well-documented in several letters that
15 have been written to Texas Utilities. And then the second
16 generic issue is the cumulative effects of some of our
17 piping analysis observations; our principal concern there
18 being of course the effect on the pipe support load,
19 although we are looking at the pipe stresses. But the
20 major impact will be on support loads.
21 MR. SHAO: Can you tell me for the generic issue,
22 how much change in response, what is the difference in
23 answer?
24 MS. WILLIAMS: Not much in pipe stress,
25 considerable in pipe support loads. You have to compare

1 the load increase to the support margins to determine if
2 they are still adequate, and it hasn't been done yet.
3 MR. SHAO: Do you know about the percentage
4 increase in loading?
5 MS. WILLIAMS: Percentages are very deceiving.
6 We have seen 1000 percent, but percentage you could have a
7 1-pound load on the support and go up 1000 percent and
8 still not be a significant load. But we have seen
9 significant load increases.
10 MR. STUART: What would the average be, Nancy?
11 MS. WILLIAMS: I really don't have an average
12 number. If I were to take a guess at it, I would pick
13 something around 40 percent.
14 MR. SHAO: Very good.
15 MS. WILLIAMS: All that data is available in
16 charts.
17 MR. SHAO: It can be overestimated, it can be
18 underestimated. It can go either way; right?
19 MS. WILLIAMS: That's right. Redistributed.
20 Texas has gone in, as a result of this finding, and
21 done some work. I have a slide on that and I will go
22 through that where we are today on that, since it is such
23 a big issue.
24 The cumulative effects, the five piping issues I am
25 speaking of here for cumulative effects are stress

1 intensification factor errors, the inclusion of fluid and
2 installation weights at valves and flanges, the mass point
3 spacing errors, the inclusion of support mass in the
4 stress analysis and pipe support stiffness.
5 In the case of the fluid and installation weights there
6 was a study done on the RHR system. We have some
7 questions outstanding as to the application of those
8 results across the board.
9 MR. SHAO: Can you tell me, the first one, is it
10 because they didn't use the computer code right or the
11 computer code wasn't written right, they cut out the high
12 frequency?
13 MS. WILLIAMS: For mass participation?
14 MR. SHAO: Yes.
15 MS. WILLIAMS: They have very rigid systems.
16 They use ADL pipe version 2 C, I think it was, which at
17 that time did not have what you refer to as the missing
18 mass option.
19 Now, also in this type frame of dealing with pipe
20 stress analysis, various AEs had ways they would
21 counterbalance that limitation in the program by, for
22 example, doing a static ZPA analysis and taking the
23 envelope of the ZPA analysis to the dynamic analysis and
24 picking the worst support load.
25 But because you have very stiff pipes, the program cuts

1 off on a displacement, and you are not getting very high
2 displacements. So what happens is you don't get the
3 effects of the higher order modes.
4 MR. SHAO: But the designers did not pick it up?
5 MS. WILLIAMS: No, it's not in our procedures.
6 And the designers did not look at the results for
7 realisticness of the support loads.
8 There is now a warning to that effect in the ADL pipe
9 manual which tells you that you should not rely solely on
10 your dynamic results for your support loads without
11 looking at them with regard to the ZPA.
12 MR. NOONAN: Would you expect a designer to pick
13 that up if he puts the computer printout on his desk and
14 he checks the mass matrix, isn't there a generic mass
15 matrix you can look at to check it?
16 MS. WILLIAMS: There are various ways you can do
17 it. Some of the output was -- they didn't do the static
18 ZPA analysis, which would be your easiest quick look to
19 find out whether the results are realistic. So not having
20 had that run output, they really didn't have -- you could
21 still add up just as we did: We found it in their results
22 by adding up the mass, multiplying it by ZPA, saying these
23 loads look a little small. But the easiest way would be
24 doing the ZPA analysis and comparing them.
25 MR. NOONAN: Yes.

1 MS. WILLIAMS: These two generic issues were
2 broken down into seven generic questions which were in a
3 letter dated March 29 from us to Texas Utilities trying to
4 summarize where the major emphasis should be based in my
5 piping reallocation programs.
6 These seven generic questions have been developed based
7 upon 10 review issues, which are available in a document
8 which is, at this point in time, upwards of about 100
9 pages long, which supplies all the references and bases
10 and a description of all the specific findings that we had
11 through the course of our review.
12 10 of them are outstanding and 11 of them are resolved
13 off of that list. We refer to that as the review issues
14 list. That's the status of it as of 4/5/85.
15 MR. SHAO: Let me ask a question. Does Cygna
16 have any recommendation to TUGCO after you look at this?
17 MS. WILLIAMS: We have not participated in the
18 development of the CPRT plan. I guess if we had any, once
19 we see the plan, we might make comments on it.
20 In the area of pipe supports, we have grouped the
21 issues by common effect, more or less. We have grouped
22 them by design loads and displacements. These are issues
23 and findings which have an effect on the design loads and
24 displacements, and then we grouped them into individual
25 specific problems we found with how they did the component

1 design on the pipe supports.

2 With regard to the design loads, they have to go back

3 to the pipe stress analysis, and when considering the

4 cumulative effects of all the discrepancies and

5 observations in that area, justify the fact that the loads

6 and the supports are realistic.

7 There is the issue of pipe support stability, which we

8 issued a position on in February of 1985.

9 There is the issue of the support load imbalance which

10 is referred to as the "rotational restraints," and the

11 problem there is that when they had double struts or

12 double snubbers or configurations of that nature they took

13 the stress load, they split it in half and they sized the

14 hardware to half of the stress load.

15 MR. SHULMAN: Nancy, let me interrupt. In

16 response to Larry's question on recommendation, the one

17 you have up there right now, pipe support stability, we

18 have given Texas a reasonable indication of what we would

19 find acceptable in that area and how they could --

20 MS. WILLIAMS: We gave them three options, but

21 we didn't amplify them.

22 MR. SHULMAN: We call it a recommendation, but

23 we certainly indicated what would be acceptable to us.

24 MR. SHAO: Yes.

25 MR. SHULMAN: I think we did the same thing in

1 mass participation.

2 MR. SHAO: Maybe that's beyond the scope of your

3 work, I don't know.

4 MS. WILLIAMS: We have thoughts on what we think

5 you should do. Our letters basically explain where we see

6 the problems and what questions need to be answered in

7 order to resolve the problem, but we don't tell them how

8 to do it.

9 MR. SHAO: Maybe I can ask TUGCO, did they ask

10 for a recommendation?

11 MR. BECK: John Beck. I would respond to that

12 question, our CPRT response plan was taking into account

13 all Cygna findings that we are aware of today and will

14 cover all Cygna findings. Our intent is to have Cygna

15 review the CPRT response plan. We will reiterate with

16 Cygna to assure them and ourselves that the response plan

17 resolves all issues that are raised by the Cygna

18 independent review.

19 The "recommendations," if I could use that word in

20 quotes, that have been included in letters of transmittal,

21 have played a role in the development of the plant so far.

22 A lot of this will obviously become much more clear, May 8.

23 MR. BOSNAK: Nancy, Bob Bosnak, NRR. Where are

24 you covering the pipe support/pipe interface? Probably

25 the root cause of some of the problems was that the pipe

1 designer and the pipe support designer never communicated.
2 Is that part of your presentation, or is that covered
3 someplace else?
4 MS. WILLIAMS: Not formally, but I can address
5 your question, which is that one of the things I am
6 looking at in putting together the summary of all the
7 issues will be the fact that, just as you pointed out, the
8 stress and the supports were separated contractually, and
9 then there were one and two and eventually three groups
10 doing pipe support designs.
11 It appears that having divided the work up in that
12 manner, although maybe more expedient, may have caused
13 interface problems that were much more difficult to deal
14 with.
15 I am looking for those trends, as I do the cumulative
16 effects and trending analysis.
17 MR. BOSNAK: Of course, it's important in any
18 get well plan that that is taken care of and that's cured.
19 MR. STUART: Also, Bob, it's looked at when we
20 look at the design process and design control. That is
21 certainly one of the key issues that one looks at is to
22 determine if, on the boundaries or interfaces in transfer,
23 that's where the problems are occurring. So it was one of
24 the very first review items I looked at, and I might add
25 caused us to go into greater and greater depth into pipe

1 stress and pipe supports.

2 MS. WILLIAMS: At least within our organization

3 as well we look at the stress supports and pipes together,

4 so that I know, based on the results, whether the

5 capabilities lie within our scope.

6 MR. VOLLMER: Dick Vollmer with NRR. With

7 record to pipe stress and pipe support, you have a couple

8 of generic category issues which I assume it's part of the

9 design process that was done this way. Can you give me an

10 idea why design review did not pick up any of these things

11 in the process?

12 MS. WILLIAMS: That's a very good question. I

13 am not ready to answer that because it's on my list of the

14 design verification review, which is part of Phase 4,

15 where we are looking at how they did their reviews, their

16 independent reviews and verification, this iterative

17 process that they have. This is the flow chart I was

18 speaking of, and how the process was supposed to work

19 versus what we actually saw when we went in and looked at

20 it, and whether leaving all the verifications to the end

21 of the process was a wise decision and whether or not

22 there is any implications, having done that, and these

23 sorts of things. There are a lot of parts to that

24 question which aren't yet done, and they are part of the

25 Phase 4 review.

1 MR. VOLLMER: You spend some time earlier on
2 criterion XVI, corrective action. Did you find in the
3 design process there was much in corrective action? In
4 other words, were there design nonperformances identified
5 in the design process as part of the original design
6 process, or was this something that was design control,
7 and verification really didn't point out discrepancies?
8 MS. WILLIAMS: We didn't see a lot of evidence
9 of having seen design errors documented, although we did
10 see within individual groups, mechanisms being set up that
11 would allow input as to errors that engineers were
12 continually seeing in this kind of thing, although it
13 wasn't always a formal process. And a lot of the
14 documents that we found, going through the corrective
15 action system, were, of course, NCRs, and trending was
16 done on NCRs. They document design deviations in their
17 design change documentation sometimes, and we found that
18 they did do a little trending on the design change
19 documentation for reoccuring errors. But I need to take
20 our technical results now, because that was a purely QA
21 type of review, where we were looking at the paper and the
22 procedures and the adequacy of the procedures now and see
23 how that matches together.
24 Okay. So in the designs -- well, then there's the load
25 transfer to the structures, where we were seeing some

1 pretty high loads on the through bolting to the civil
2 structures, and we need to assure ourselves that, in fact,
3 these loads have been properly accounted for and that they
4 are in keeping with the original design assumptions for
5 the civil structures.
6 The "effects of large displacements" deals with the
7 gaps on frames for pipe supports. We have looked at this
8 in Phase 2 for seismic; seismic displacements at Comanche
9 Peak are very small. But we have not convinced ourselves
10 that for the large displacement loading event, such as
11 steam hammer and water hammer, that that is not a problem,
12 that sufficient gap has been provided on the box frames --
13 not the box frames that have zero gap around them, but
14 your standard frame for a pipe support that requires space
15 to accommodate this movement.
16 Then I have a couple of specific examples, support
17 component design discrepancies and observations that we
18 had. For the most part, these are still open issues. We
19 have done some evaluation on some of these ourselves, for
20 example, the tube steel punching shear. This punching
21 shear is not the step 2 smaller tube welded to a smaller
22 tube. To punch through we did address that as part of the
23 shearings. But there was an additional problem in Phase 3
24 where they have used tube steel and drilled holes through
25 the opposing side and used it as backing plates to cinch

1 U-bolts, where we were also concerned of a similar tearing
2 effect of the nut through the tube steel wall.
3 U-bolts and box frames are probably very familiar terms
4 to most of the people here. The U-bolt analyses I am
5 going to go into in a little bit more detail. We have
6 done some extensive review there, and it still remains
7 open. The box frames are a problem with the thermal
8 growth of the pipe. We understand some modifications have
9 been done but all of this, I believe, is going to be
10 wrapped up in the CPRT plan. We are not quite sure what
11 all the corrective actions are at this time.
12 So in total, we summarized the issues into 11 generic
13 questions. There are 18 outstanding and 10 which have
14 been resolved at this point in time off of the summary
15 generic issues letter. As we just discussed, the
16 cumulative effects is still in process.
17 MR. NOONAN: Nancy, can I get you to expand a
18 little bit? When you say "resolved," can you say what
19 that process is? How is it resolved?
20 MS. WILLIAMS: Let's see if I can think of an
21 example of one that was resolved. I don't have the right
22 letter, but "resolved" is that we have done an analysis or
23 TUGCO has done an analysis which closes the issue out and
24 checks for cumulative effect and extent.
25 MR. NOONAN: You mean if TUGCO does the analysis,

1 then you take -- they get it back to you? I am looking
2 for the procedure.
3 MS. WILLIAMS: Sometimes we would -- there are
4 many, many letters over the course of the last year. We
5 would say: "We found this. Please provide supporting
6 documentation or calculations" or what have you. They
7 will send it. We will review it. We will sometimes ask
8 more questions. Sometimes we will do alternate
9 calculations as well ourselves. And then through this
10 process we have resolved 10 issues, but you still can't
11 lose sight of them for the cumulative effect, so that is
12 why they are still on the list.
13 If you look at the review issues list, that big
14 document, you will see some status just "closed." That is
15 because we have arrived at sufficient information in order
16 to resolve the particular issue.
17 MR. STUART: There are two major lists which
18 govern the outstanding issues on the program: the review
19 issues list, with pipe supports at 28 items, and the
20 generic issue list, which is really subdivided into 11
21 questions. We did that for two reasons. Review issues
22 lists often get into specificity. This particular pipe
23 support, we found this particular problem, and really did
24 not look at the expansion, necessarily, of those issues,
25 out into other areas.

1 So in order to provide some assistance to TUGCO in
2 knowing exactly what the issues are for CPRT resolution,
3 where they should be looking at the generic, as well as
4 the specific, we then created the generic issues list
5 which are summarized here in these tables.
6 So, in addition to what is here, there are still 18
7 specific issues outstanding, which will need to be
8 resolved as a subset of the generic resolution program of
9 CPRT.
10 MR. BOSNAK: Dick or Nancy, while you are on
11 this subject, could you describe for me what you mean by
12 "expanded review"; what does that really mean?
13 MS. WILLIAMS: I have two examples coming up.
14 In the case of mass participation, we had reviewed nine
15 stress problems. What we were finding was an average
16 participation on the order of 30 to 40 percent in any one
17 direction, and sometimes as low as zero percent. So we
18 documented this in a letter, and Gibbs & Hill and TUGCO
19 put together a program to study the effects to determine
20 whether these percentages would result in any significant
21 load increases on the pipe supports.
22 We then went and spot-checked their conclusions. We
23 reviewed their plan. We made comments on it.
24 In most cases we are saying, no, you have really got to
25 go in and reanalyze these problems to determine the

1 effects. They initiated eventually a program where they
2 ended up reanalyzing, I believe it was approximately 205
3 out of a total of 271 pipe stress problems, and we went in
4 on two different occasions and spot-checked both the
5 stress analysis end of the implementation of the plan, and
6 the pipe supports.
7 We went in and reviewed another 270 supports outside of
8 our original pipe support review scope and checked to see
9 if we agreed with Gibbs & Hill's and TUGCO's conclusions
10 that it wasn't an issue, that they really didn't have to
11 do any redesign because of it.
12 Right now, it is still open. There is a letter -- the
13 letter noted down at the bottom of the slide here,
14 February 8 of '85 -- where we gave TUGCO the results of
15 our review; and although we don't feel there's a problem
16 on the stress analysis side, we do feel that more work is
17 required on the pipe support adequacy side in evaluating
18 the effect of the load increases.
19 So in that case we essentially ended up extending the
20 review well beyond the bounds of our original nine stress
21 problems.
22 MR. BOSNAK: So every place we use the term
23 "expanded review," you have documented bases to
24 demonstrate why you feel whatever the resolution was was
25 acceptable?

1 MS. WILLIAMS: That's correct.

2 MR. SHAO: How do you resolve the piping and
3 pipe support you have not analyzed and may have similar
4 problems?

5 MS. WILLIAMS: Well, that is exactly the problem
6 we have with what they have done so far. That's all
7 documented in this letter. We think that from the stress
8 standpoint, although they reanalyzed 205 problems and we
9 don't have any problem with the stress analysis with those
10 205 problems -- that's pretty straightforward -- they came
11 up with having reanalyzed, starting from the bottom up,
12 zero mass participation on up. They only got as high as
13 40 percent mass participation, having reanalyzed 205
14 problems, which means there's another 1/3 of the stress
15 problems which have participation factors anywhere between
16 actually, I believe, it's 30 and 100 percent.

17 We can't tell that there isn't a low margin support in
18 that third of the piping analysis such that any load
19 increase would be a problem, and they still, for that 1/3,
20 don't comply with their FSAR, so we think that they have
21 to do some more work for that balance of the problems.

22 MR. TRAMMELL: Nancy, I am Charlie Trammell. I
23 think maybe I would like to take a short break. I think
24 our participation would be enhanced if we could take a
25 short break at the appropriate time, whenever you think

1 that might be.

2 MS. WILLIAMS: I am at the end of supports and

3 stress. I was going to explain the stress intensification

4 and U-bolts. I think I am done with mass participation.

5 MR. STUART: There are two more slides to finish,

6 pipe and pipe supports. That's a logical point.

7 MR. CHEN: Nancy, this is Paul Chen. How about

8 loads on piping, did you look at that also?

9 MS. WILLIAMS: Yes, we did. They weren't too

10 bad.

11 MR. SHAO: Did you find any area in need of

12 physical modification at all?

13 MS. WILLIAMS: Well, Gibbs & Hill's conclusion

14 out of that study was load increases would be accommodated

15 by existing design margins in the supports. Therefore

16 they said "no" modifications were required.

17 MR. SHAO: What do you mean by design --

18 MS. WILLIAMS: They were saying, for example,

19 that if you were to look at the weak link in the support,

20 let's just say the weld calculations, that the weld

21 calculation was sufficiently conservatively designed such

22 that it can handle the increased load without modifying

23 the support. We went in and checked that for 270 supports,

24 and we had a hard time convincing ourselves that, in fact,

25 a rigorous enough effort had been expended in checking the

1 adequacy of the supports, because we found it very
2 difficult to assemble all of the documents necessary to
3 make those judgments.
4 We had a lot of difficulty with the gang hangers,
5 because there you are talking about multiple load
6 increases or decreases. We could not convince ourselves,
7 based on the documentation there, that they had done a
8 thorough review of the pipe supports and that they really
9 were okay and did not require modification.
10 So as I stand here today, in my mind that's still very
11 open.
12 MR. STUART: Also, Larry, what was tended to be
13 done is not only was it not a complete look at all
14 supports, but also when they looked at the gang supports,
15 as an example, they would do a final reanalysis of the
16 gang support but not get back into the various design
17 details -- for instance, check every single weld to insure
18 those welds were okay.
19 MR. SHAO: So you are essentially sharpening the
20 evidence without seeing any criteria?
21 MS. WILLIAMS: We didn't see any evidence of
22 sharpening their pencil. Someone had initialed the loads
23 and the support as being okay. So we had to go recreate
24 and convince ourselves from a technical standpoint that
25 there was no technical problem, but we found enough areas

1 that we were questioning where there wasn't an overstress
2 question, so we had to question them on it.
3 MR. STUART: I might add that TUGCO and CPRT are
4 well aware of this issue, and are planning to accommodate
5 that in the program that's going to be presented next week.
6 MS. WILLIAMS: This is stress intensification
7 factor findings. All the way back in Phase 2, we found a
8 problem with stress intensification factors used for the
9 butt welds. That basically amounted to a problem with the
10 fact that the construction specification allowed them to
11 use 1/32nd of an inch mismatch, but stress analysis did
12 not account for that accordingly. So there was a
13 difference between the design assumptions and what the
14 field was allowed to do in the construction end of the
15 process. We ended up doing expanded review. There are
16 several documents out in the public forum that describe
17 our findings and resolution with regard to that.
18 Then we go into Phase 3 reviews and we found more
19 problems with the stress intensification factors for
20 tapered points and Bonney Forge fittings.
21 There we found omissions of the proper SIF in the
22 stress analysis, incorrect calculations of the SIF for
23 input to the stress analysis and other types of -- for the
24 inconsistent errors associated with the input and use of
25 stress intensification factors in the stress analysis.

1 So we did an expanded review in this case of some more
2 pipe stress problems to evaluate the effects. And those
3 particular expanded reviews on 36 stress problems did not
4 result in any overstress conditions when we went in and
5 checked the errors, but we still felt a little
6 uncomfortable with it. So as part of the mass
7 participation reviews documented in our mass participation
8 letter, we have asked that they also look for the
9 appropriateness of the stress intensification factors and
10 go in and check that as they are doing the reevaluation
11 for the mass participation problem.
12 Those prior two slides, for example, were Cygna's
13 findings out of the review. Now I have selected one for
14 an example. It was the Walsh/Doyle allegation that we
15 were exposed to in our February, 1984, hearings.
16 We, after looking back across all reviews phases, found
17 51 examples of cinched U-bolts. And what they were
18 basically doing was employing cinched U-bolts in place of
19 a clamp to maintain positive connection between the
20 support and the pipe, and there were many allegations
21 raised as to the effect of a U-bolt on the local stresses
22 of the pipe and the thermal expansion of the pipe, and
23 finally the ability of the U-bolt to maintain its cinched
24 condition through the operating life of the plant since
25 it's A-36 steel which has some relaxation characteristics

1 associated with it.

2 So what we have done there is reviewed the Westinghouse
3 testing and analysis program that was instituted by Texas
4 Utilities, and we have gone literally line by line through
5 both the analysis and the testing. We have traced every
6 number through to make sure that we can recreate it. We
7 have done printed element analyses on our own to make sure
8 we agree with such things as the metric size. We have
9 found some discrepancies where we cannot recreate the
10 information.

11 We have documented that in a letter, and we are going
12 to, sometime in the future, I believe, sit down and try
13 and fill in the holes with the data and talk to
14 Westinghouse and figure out where the construction
15 problems lie and how they got the information and just try
16 and recreate it, have a working session, is the only way I
17 think we can convince ourselves that that program analysis
18 is sufficient reason to accept that design.

19 MR. SHULMAN: That is a perfect time for a break.

20 (Recess.)

21 MR. NOONAN: Nancy, I want to ask one question.
22 I want to refer back to the last slide up there. This was
23 on the Walsh/Doyle allegations. Here you talk about the
24 Westinghouse results. You said to verify Westinghouse
25 results. Was there anyplace in your review that you

1 looked at the interface between Gibbs & Hill and
2 Westinghouse?
3 MS. WILLIAMS: No. There was no stress analyses
4 or piping systems in our scope where we look at
5 Westinghouse work. The system parameters, operating
6 temperature sort of thing, we took as givens from
7 Westinghouse. The single equipment qualification, the
8 valve we did, that was a Westinghouse qualification report,
9 and that's it.
10 MR. NOONAN: This case here, this was a
11 Westinghouse analysis. That's why you looked at it?
12 MS. WILLIAMS: Yes. This was TUGCO's answer to
13 the allegation as the only document available for review.
14 It happened to be that Westinghouse was contracted to do
15 the work.
16 MR. NOONAN: Thank you.
17 MS. WILLIAMS: On to cable trays. I am going to
18 try not to get into a lot of depth on the cable trays. I
19 would be glad to answer your questions, but there's just
20 an awful lot of issues hanging out there on the cable
21 trays. I haven't totally gotten my hands around how they
22 all interrelate to each other, but we have attempted to
23 group the issues into five categories so that any
24 follow-up reviews and work could be focused along the
25 lines that would best address the majority of our concerns.

1 The first of the five categories is the design loadings,
2 and there are a couple of issues out there which will
3 affect the assumptions with the design loads that they are
4 using. There were some assumptions made in the front end
5 of the project that the operating basis earthquake event
6 governs, and that creates some problems in your allowable
7 stresses, and safety factors for components that are not
8 allowed to have increased allowable stresses in the SSE
9 event. Gibbs & Hill has done some response spectra
10 analysis. The original design was predominantly an
11 equivalent static analysis and no system models,
12 individual support design, which is fine. But in a couple
13 of cases they did some response spectra analysis to assess
14 the effect of generic field deviations and things of this
15 nature. When they have done the response spectra analysis,
16 we have had some problems with it on the enveloping nature
17 of the analysis, the modal combinations, closely spaced
18 modes, and in extrapolating the results across the board.
19 MR. SHAO: Do you find a problem with the
20 equivalent analysis also?
21 MS. WILLIAMS: Oh, yes. I will hit on some of
22 those later also.
23 MR. SHAO: Okay.
24 MS. WILLIAMS: They have also done some generic
25 studies -- for example, working point deviations in the

1 field -- and we have had some problems with the fact that
2 there are so many design changes, pieces of paper
3 outstanding on a given cable tray support drawing, that
4 it's very, very difficult to assemble all of the paper
5 when you are talking about 500 design changes on a given
6 civil structural drawing. Then you have to narrow
7 design -- which design changes are applicable to the given
8 support that you are trying to review. But we did sit
9 down, in a quite lengthy process, go through and sort all
10 of that paper for all the drawings in our review scope.
11 What we found, then, was that the process that Gibbs &
12 Hill had used in doing their generic evaluations did not
13 properly account for all the change paper that was out
14 against the Gibbs supports, and we are still assessing the
15 effects of that.
16 They have used what we refer to as a "systems concept"
17 for design, and there are assumptions implicit in doing
18 that type of design where they separate out the
19 longitudinal and transverse support systems. That's an
20 acceptable way to do things in that it's been a practice
21 by many AEs to do it that way. But you do have to make
22 sure that your hardware is compatible with your design
23 assumptions. What I am speaking of here is primarily the
24 clamps. If you have got bolted clamps and you are saying
25 it's not seeing a longitudinal load or vertical load,

1 it's probably not a realistic assumption.

2 MR. SHAO: The design change problem you find in

3 the cable tray support area, do you find in pipe support

4 too or piping or just cable tray?

5 MS. WILLIAMS: Not so much. They revise the

6 pipe support drawings quite frequently. I would say that

7 the maximum amount of design changes outstanding against a

8 given drawing have been on the order of two per support;

9 but we did go back and trace through all the design

10 changes and revisions to the drawings over time to make

11 sure that everything was properly accounted for.

12 Then we had some specific problems with design of

13 particular components, using the equivalent static load

14 method. There were some problems with the effective

15 length for buckling, basic compliance with ASIE. They

16 have used channel design instead of cable strut. They

17 have to comply with ASIE. We have found different

18 examples where that was a problem.

19 Because they have used channel sections, they have

20 created another set of problems, which is that you have a

21 lot of eccentricities. You have eccentricities associated

22 with the placement of the load, the connection of beams to

23 hanger members and on through up to the base connection

24 design where they have used angled, which is another

25 eccentricity. These things, when you start to get into

1 highly-stressed members, become more important.
2 There's a couple of members that were designed pretty
3 close to the limit, and as a result, when you start to
4 consider what you could construe to be minor effects in
5 some cases or maybe in ordinary circumstances, they become
6 more important.
7 The Richmond inserts is something that is also tied to
8 an allegation: We are reviewing the documentations that
9 are available through TUGCO on the Richmond insert testing
10 program, the allowables for Richmond inserts and the
11 application of the Richmond inserts at Comanche Peak. One
12 major problem, to address some of your questions more
13 specifically, on the equivalent static analysis they have
14 used an amplification factor of 1.0. We have done some
15 studies, Gibbs & Hill has done some studies. It looks
16 like it should be something on the order of 1.14, but only
17 for the specific case analyzed.
18 That is, that when they did the analysis to determine
19 what a reasonable amplification factor was, there was
20 assumed support spacing, there were certain assumptions
21 that went into that which you would have to account for
22 before you blanket apply the 1.14 factor.
23 MR. SHAO: NRC asks for 1.5?
24 MS. WILLIAMS: Yes, 1.5 or justify something
25 less, and there was no justification.

1 Conduit supports is in many cases much a repeat of some
2 of the same findings in cable tray. They were done by the
3 same group. They have found problems in unit strut that
4 led to some testing that is ongoing right now. Because of
5 the type of sections, there are many of the same load
6 problems, compliance problems and they are very similar.
7 MR. SHAO: Let me try to understand root cause:
8 Why did they use 1.0, because designer is not aware of NRC
9 requirement, or they just --
10 MS. WILLIAMS: That was my first reaction. I
11 haven't seen anything that supports -- that shows me that
12 they really thought that out. There no documentation that
13 says they made a conscious decision to use 1.0.
14 We have seen other examples of their work, but this,
15 like mass participation, seems to have slipped by. We are
16 going to look at it in terms of a corrective action
17 program and whether it should have been caught, but we
18 have seen other instances in the same group where they do
19 follow all of the NRC requirements. So this one example,
20 we couldn't find any evidence that they made a conscious
21 decision to use and justify 1.0, so I would have to assume
22 that they just flat out made a mistake.
23 MR. VOLLMER: Dick Vollmer. I assume for these
24 areas, many of the issues are parallel to having stress.
25 My question on design control, and your response, would be

1 the same: that is, the design control, in fact, design
2 review, is something you haven't decided upon. Why it
3 didn't have an influence on this?
4 MS. WILLIAMS: Design control in cable trays?
5 MR. VOLLMER: Design review. Why didn't design
6 review catch these things?
7 MS. WILLIAMS: The design review part is still
8 open. I can make one comment in particular to this group,
9 the structural group that did the cable tray supports:
10 that's really that they didn't have procedures governing
11 the work. That appears to be part of the problem.
12 MR. VOLLMER: What was their mode of design
13 review, nominally, one of a checker?
14 MS. WILLIAMS: Line by line checker.
15 Okay. I am not going to iterate on the conduit
16 specifics, because they are very much the same. As you
17 can see, we have grouped them very much the same as we did
18 the cable tray supports. The keynote here is there are
19 124 issues outstanding, and none of them have been closed
20 at this point in time.
21 Okay. In the electrical area --
22 MR. SHAO: Before you leave cable tray supports,
23 can you tell me a little bit about Gibbs & Hill pipe
24 structure group? I mean, this is a particular group
25 working on cable tray support or did they work on

1 something else?

2 MS. WILLIAMS: This group -- Gibbs & Hill is

3 divided where they have a design group, which is like the

4 structural design group. They also have a special

5 analysis group. So whenever -- for example, building

6 analysis: structural group needs the building analyzed,

7 they turn to special analysis. So really we are talking

8 about the two groups here. The structural group did the

9 cable trays and did the conduits, then special analysis

10 did any of the computer analyses required to support that

11 design effort.

12 MR. SHAO: Is that the only component they

13 worked on, did they work on any other components?

14 MS. WILLIAMS: As far as I know. I am still

15 checking this out. This is my flow chart activity for the

16 cumulative effects. I think they did the regular civil

17 structures as well.

18 MR. STUART: I might add, Larry, I believe --

19 again, that's part of our review, but I believe at the

20 point in time when the procedures were quite well known

21 and quite well used throughout the industry for civil

22 structural design, at that point the hanging of the cable

23 tray supports was not a commonly standardized procedure

24 throughout the industry. I suspect that's one of the

25 reasons for the procedures not existing at that point in

1 time.

2 MS. WILLIAMS: On electrical, overall, it was

3 pretty clean.

4 We found one instance where the pressure temperature

5 readings for the installed equipment were different than

6 that stated in the design documents. We checked it out,

7 and there were no resulting problems. They just had to do

8 with the evolution of the design and the documentation of

9 it, essentially.

10 I believe it was three instruments out of 24 that we

11 found that to be a discrepancy, but not a major

12 discrepancy in terms of magnitude of the numbers involved.

13 MR. CALVO: Nancy, the electrical is only

14 related to the RHR and component water cooling system?

15 MS. WILLIAMS: That's correct.

16 MR. CALVO: Insofar as the electrical equipment,

17 how will you stand, how many motors do you look at or how

18 many valves?

19 MS. WILLIAMS: On the RHR system we look at the

20 control circuitry for one motor-operated valve and the

21 power circuitry to the pump. That's all there was in the

22 two stress problems.

23 MR. CALVO: The motor you looked at happened to

24 be inside the containment or outside?

25 MS. WILLIAMS: Outside.

1 MR. CALVO: How about the component cooling
2 water system?
3 MS. WILLIAMS: For the component cooling water
4 you looked at, I think, seven valves, the power to the
5 pump, and various instrumentation along the length of the
6 line. Other than that, there are a lot of passive
7 components.
8 MR. CALVO: You didn't go back to the source, to
9 the diesel generators, did you go back to the motor
10 control centers?
11 MS. WILLIAMS: We went back to the switch gear
12 on the power. Once you get beyond the switch gear you are
13 sizing, you have so many inputs; you are talking about
14 going back to the whole plant if you want to go back to
15 the diesel, so we had to take that as an input.
16 MR. STUART: I might add for all of our review,
17 because you are looking at a system that is interconnected,
18 we, in essence, had to draw, sort of, walls, assuming that
19 the inputs coming in through those walls or through those
20 interfaces were correct, and then also draw a wall on the
21 output side, assuming where that information was passed on
22 was also correct. Those are defined in the areas of our
23 review.
24 MR. CALVO: The electrical equipment that you
25 looked at, were there some interfaces that had to be

1 established between Gibbs & Hill and the electric? Would
2 you take that, Ms. Williams.
3 MS. WILLIAMS: We would take the Gibbs & Hill
4 and Westinghouse as a given and the rest was Gibbs & Hill.
5 All the rest of the design was Gibbs & Hill.
6 MR. MARINOS: I am Evangelo Marinos from NRR.
7 Did you look at the interface between the pump motor
8 requirements, is that something you did? Was it within
9 the scope of review of your electrical system requirements,
10 what would be the pump requirements with regard to a motor
11 design?
12 MS. WILLIAMS: Yes, we had horsepower rating and
13 the sizing; and any mechanical systems we check the sizing
14 of the pumps, we check the horsepower rating, we would
15 check compatibility of the motor operator on the valve to
16 drive the valve, this sort of thing.
17 MR. MARINOS: What about voltage drops?
18 MS. WILLIAMS: We looked at all the voltage
19 drops, circuitry.
20 MR. CALVO: Were the breakers sized properly?
21 MS. WILLIAMS: Yes, I believe; I will have to
22 double-check the extent we looked at that.
23 MR. MARINOS: You did that for one RHR motor and
24 one cooling component motor?
25 MS. WILLIAMS: Yes.

1 MR. CALVO: I guess my question is why did you
2 bother doing this, because you get so little and you can
3 conclude so very little from it?
4 MS. WILLIAMS: We don't select the scope.
5 MR. STUART: That was the scope agreed upon
6 between TUGCO and NRC, so I would ask partly how was that
7 scope determined from your point of view.
8 MR. CALVO: Okay.
9 MS. WILLIAMS: So there is one issue outstanding,
10 which is the implications of the pressure temperature and
11 there are three issues that are resolved at this point in
12 time.
13 The mechanical systems review, this is the area where
14 we had the one definite potential finding where we wrote a
15 letter and notified the Commission, as well as Texas
16 Utilities, of a finding in this area. To the best of my
17 knowledge, TUGCO has filed a 5055 E or at least done an
18 interim 5055 E evaluation, which I understand that we will
19 be getting a copy of for the common mode failure problem
20 that we found in the CCW system.
21 MR. THADANI: Nancy, this is Ashook Thadani
22 again. Can you describe what type of common mode failure
23 you identified?
24 MS. WILLIAMS: It was the thermal barrier leak,
25 which was the limiting -- in leakage to the system it was

1 a limiting condition. You had to isolate that, and they
2 did not have a single failure-proof valve to isolate that
3 event.
4 But I don't understand that single failure-proof
5 criteria problem with the valve. The systems, train A and
6 B, are cross-linked, and there's no ability to isolate
7 them such that you could keep one train running and not
8 drain the surge tank, which would get rid of all your makeup
9 water for the system.
10 It's not necessarily a particularly difficult fix. I
11 am not quite sure how TUGCO evaluated that, but it's still
12 an outstanding question for us.
13 MR. MARINOS: Did you do flow to determine the
14 adequacy of the design, as it was, for the component
15 cooling or RHR, did you go that far to determine that it
16 was a proper design?
17 MS. WILLIAMS: For the CCW we looked at Gibbs &
18 Hill calculations.
19 MR. MARINOS: Also the transfer?
20 MS. WILLIAMS: The heat exchangers and in fact
21 the component water cooling system, since it had so many
22 interfaces with the other systems. It tends to change a
23 lot, because design parameters change on one system,
24 affects the CCW system. So that was probably a pretty
25 good one for interfaces that way.

1 MR. MARINOS: You did independent calculations
2 or you just checked theirs?
3 MS. WILLIAMS: We checked theirs.
4 Okay. Compared to that issue, the mechanical area, the
5 others are fairly straightforward. One is just we are
6 concerned about how they controlled the appendix R
7 modifications, because one of the things that we checked
8 was more or less a hazards review where we checked that
9 all of the components in the system are adequately
10 protected from various scenarios; and in this case to
11 separate the trains, they needed a fire door between the
12 two rooms. And at the time we went into the walkdowns and
13 didn't have the proper UL rating. They did correct it,
14 but we couldn't find any way these things were being
15 tracked and controlled. That's still an outstanding
16 question.
17 MR. CALVO: I thought you were only doing the
18 design review. You also checked the as built?
19 MS. WILLIAMS: Yes.
20 MR. CALVO: You did it also for electrical
21 system, mechanical systems?
22 MS. WILLIAMS: Yes, checked the wiring on MCCs,
23 looked at the wiring in the control room, checked the
24 train separation, walked down the cable trays.
25 The other one is changes in design parameters over time,

1 which is getting back to what I was saying. The CCW does
2 change a lot. There were some changes that appeared
3 inconsistent. Although it was not a problem here, we just
4 felt that they should close the loop on the documentation
5 of the CCW system.
6 The last category is design control. I have talked
7 quite a bit, really, about the cumulative effects review,
8 and the corrective action and the document control system
9 prior, when I was on the section on scope and methodology.
10 This is basically a repeat of this, indicating that this
11 is our biggest effort we have right now aside from closing
12 out individual technical issues, and there are eight
13 review issues outstanding and eight that have been
14 resolved.
15 Okay.
16 MR. SHULMAN: A brief discussion of the role of
17 the senior review team and how we fit in. I guess one
18 comment, in the early stages of the project, particularly
19 Phase 1 and Phase 2, the senior review team had a
20 different makeup that was composed of internal Cygna
21 people, primarily from the management team. I think
22 that's consistent with your discussion about the
23 management overview.
24 As we got into Phase 3 it became apparent that we were
25 dealing with a different animal. In addition to myself,

1 we felt we would need to accrue some industry-recognized
2 experts in some of the areas that we felt were going to be
3 the major areas of concern and the areas that we were
4 going to scrutinize.
5 For that reason, we chose the people that Dick
6 mentioned before. I would like to briefly go over our
7 qualifications. What I think the qualifications reflect
8 are a group of people with more years than we would care
9 to count of significant involvement with projects of
10 engineering design and analysis, which were very complex
11 issues. In my case, mainly project management. In the
12 case of the other distinguished gentlemen, quite a bit of
13 consulting.
14 I think that is what is reflected on the four slides.
15 This is mine and Spence Bush's, for those of you who don't
16 already know Spence. Dr. Bob Kennedy, our resident
17 dynamic analyst expert.
18 MR. THADANI: Is Bob Kennedy still a member of
19 the senior review team?
20 MR. SHULMAN: No. His involvement ended pretty
21 much a couple of months ago on Phase 3, pipe support and
22 pipe support issues and dynamic analysis. Basically he is
23 working with his current employer now.
24 And Bob Nickell, who is with us today as well.
25 What I would like to do is briefly outline the

1 responsibilities of the group. There are primarily four
2 categories, what I call equalization of acceptance
3 criteria on key issues. By that I mean what we of the
4 senior review team, the design review group, our project,
5 should find acceptable in resolving a given issue. We did
6 a lot of that on the mass participation issue and Bob
7 Kennedy played the major role there.
8 I think another issue that we have delved into that way
9 is the support and stability issue, in which Bob Nickell
10 has played the primary role.
11 On U-bolts, Spence Bush and myself have been involved
12 in reviewing and determining what we would find acceptable.
13 We were involved a lot in finding there were some
14 questions about the final element and the mesh, how the
15 test results correlated to what the analyses were, and
16 raised those issues and identified what we would find
17 acceptable; and I was talking to Larry before that, and
18 that way I think there were, if not recommendations,
19 indications of what we thought had to be done.
20 Technical review of the Cygna observations, here we
21 looked at things like was the physical reality a problem.
22 There were a couple of issues where we determined that
23 they really weren't issues in our mind. One issue that
24 was raised was line load on a pipe from support. Well, we
25 determined that's a local effect. Very shortly you would

1 have some local yielding, the stresses would dissipate and
2 there would not be an overall integrity problem.
3 On the other hand on some of the finer results, we
4 determined the meshes were not acceptable. In the case of
5 generic implications, we asked questions -- we got back
6 results that said, "Well, this was a problem, but it was
7 60 percent of allowable when we finished looking at it."
8 We said, "Okay, what was it before you looked at it?" "Oh,
9 it was 20, 25 percent." Well, that wasn't acceptable to
10 us. How do I know what that's going to be in another
11 system?
12 So we asked questions about how to extrapolate to other
13 systems. We even looked at small deficiencies and small
14 deviations and asked ourselves the question, could they be
15 bigger on other systems? So that kind of thinking is what
16 went on in the senior review team meetings; and on several
17 issues and on a wide range of issues at times.
18 The final thing is that we have responsibility for
19 final sign-off on the reports. In the case of Phase 4,
20 that would be a process where we are demanding two weeks
21 before the report goes out; during that period we will
22 have a meeting and then do a review individually, and then
23 sign off on the report.
24 That's been fairly consistent with what has gone on
25 over the last six months, although we have increased from

1 one week to two weeks, because we said one week was not
2 enough for us.
3 I would like to point out that a large part of our time
4 has been spent on the key technical issues. We think that
5 is what is important for us to be doing. I really think
6 at this point it might be a good idea for Bob and Spence
7 to comment on some of those technical issues and also make
8 a statement on the evaluation of the process that they
9 have seen at Cygna over the last six months to a year.
10 MR. NORKIN: May I ask one question, please?
11 Don Norkin, INC. I have looked at the qualifications of
12 the senior review team. I realize that INC electrical and
13 mechanical systems did not have very much in the way of
14 findings, but I also noticed that nobody on the senior
15 review team seems to have any experience in those areas.
16 Could you comment on that?
17 MR. SHULMAN: Well, two comments. The closest
18 to that in synthesis in problems is Spence. As far as we
19 could, we looked at that.
20 The other point is we didn't find any issue that we
21 thought needed that kind of review. We just didn't add
22 anybody, because we felt that the internal interface was
23 there to make the assessment.
24 MR. NORKIN: Were there any issues in the
25 electrical, for example, that came to the team for

1 analysis?

2 MS. WILLIAMS: The report is not issued.

3 MR. SHULMAN: That's one thing, the Phase 4

4 report is not issued yet.

5 MS. WILLIAMS: They have not reviewed the

6 observations yet.

7 MR. SHULMAN: When it comes to us, we will make

8 the determination whether we feel comfortable that's

9 enough or we have to go out for more.

10 MR. STUART: But you are absolutely correct.

11 The senior review team is primarily an engineering

12 mechanics-based team, because that's about where 80

13 percent or more of the review was done.

14 MR. NORKIN: The question in my mind, that I

15 can't answer right now, or shouldn't, is whether there is

16 any comfort that the review properly proceeded in those

17 areas, even though I hear you talking about the fact that

18 there wasn't much to uncover in those areas. But I wonder

19 about hard questioning, whether they did dig deeply enough

20 in those areas that so little came out of.

21 I wonder whether the team would have that role to

22 question at it.

23 MR. STUART: I think there are two parts to look

24 at. You are only looking at the resumes of the senior

25 review team. You are not looking at the resumes of the

1 people that did the review. About 20, 30 percent of our
2 staff is electrical, INC personnel that have been in the
3 industry five to 20 years.
4 So in terms of the actual review, they are done by
5 people as capable -- that you run into every day.
6 As far as the senior review team, the level of detail
7 that was required thus far for electrical INC review was
8 very minimal.
9 MR. NORKIN: One additional question. These
10 people that did the electrical review, for example, for
11 the most part, did they have AE experience?
12 MR. STUART: Yes.
13 MR. SHULMAN: I think we could probably provide
14 resumes of these people. They are very senior people.
15 MR. STUART: I believe they all have AE
16 experience.
17 MR. NORKIN: That's all I have right now.
18 MR. SHULMAN: Stone and Webster, typical makeup.
19 Bob.
20 DR. BUSH: I guess I approached it. I didn't
21 entitle it in depth, but I might give an idea, I think I
22 looked at a lot of paper that Nancy managed to send me.
23 I was concerned from the point of view of the adequacy
24 of the write-up in the first place, and I am talking now
25 what Cygna prepared: Was the position that was

1 established justified on the basis of the write-up, and
2 were the actions taken on the basis of the proceeding
3 items valid? After all, that's the bottom line.
4 Some was done by correspondence; a lot of it, as Mike
5 indicated, was in face-to-face meetings.
6 I would say, for example, I haven't attempted to sit
7 down and do in-depth independent calculations. I didn't
8 visualize that as the role. I think one could in very
9 specific areas, but at least in my case I haven't.
10 One of the things I was interested in, you can be in
11 violation, but it can have trivial, if any, safety
12 significance; so you could spend a lot of time on
13 something that really didn't have much significance.
14 So I tried to look at this.
15 One of the unfortunate problems, this is not mainly, of
16 course, a concern with what I call the piping system and
17 the attachments thereto. Unfortunately this isn't what I
18 would call a forgiving piping system. It tends to be
19 quite inflexible, and everything that happens, therefore,
20 tends to be exaggerated. So you see this interactive
21 effect that you have to worry about in this instance, as
22 an example of the type of thing.
23 But basically a way of approach has been to talk the
24 issues over one by one and establish whether we tend to
25 converge or not, and if we don't, converge. I don't think

1 that Mike indicated it, but this is done usually by
2 interfacing the experts. In other words, when we are
3 sitting around there, Gordon, Burkman and others will be
4 in to describe their end, so we can pose the questions at
5 the time.
6 So there is a great deal of interaction in that respect.
7 MR. SHULMAN: Spence, those experts are
8 full-time people on the Comanche Peak project.
9 MR. TRAMMELL: I have a general question on your
10 sign-off on the final report. Is that the type -- in
11 other words, what does that mean? For example, the report
12 doesn't go out unless you like it, or the report --
13 MR. SHULMAN: The report doesn't go out unless
14 we agree with it.
15 MR. TRAMMELL: Unless you agree with it?
16 MR. SHULMAN: Yes.
17 DR. NICKELL: I guess to follow up a little bit
18 too, this also goes along with some of the correspondence
19 issued to date. Many of the correspondence that
20 identified particular technical items, we have face-to-face
21 meetings where we draft the language, we argue out the
22 position, we eventually reach a concurrence and then we
23 review the actual written material before it goes out in
24 draft form.
25 But I also wanted to follow up one other question.

1 Those of us who are on the senior review team are really
2 supplementary to a quite high level of base line
3 experience at Cygna already.
4 This is to cover this question about electrical and so
5 forth.
6 The intention was to provide supplementary specialized
7 expertise in those areas where Cygna felt there was not so
8 much a deficiency, but perhaps the need for some
9 additional specialized expertise.
10 In my particular area, that not only meant reviewing
11 documentation, but getting fairly deeply involved in
12 developing position papers on particular issues; and also
13 arguing in meetings of the type that has been alluded to
14 here, arguing about the significance of a particular issue,
15 whether it's generic or not, and whether a resolution has
16 been achieved or not.
17 I think that's what we bring -- too much experience
18 maybe and too little hair, right, Mike?
19 MR. SHULMAN: Well, I don't want to say that.
20 DR. NICKELL: In my particular case, I think the
21 particular areas that they wanted me to help out on were
22 primarily in the area of pipe support stability, the issue
23 of localized pipe stresses, especially where gaps were
24 involved; perhaps things like bolting, where I had a heavy
25 involvement of the bolting program at EPRI, there was some

1 help there; the issue of unbalanced forces and ASME code
2 classification, a lot of the ASME code classifications
3 crop up. I get involved in those as well. So it's
4 primarily those areas where I try to help out, what I
5 would call design analysis, design evaluation and
6 engineering mechanics.
7 MR. SHULMAN: Yes.
8 MR. NORKIN: In order to determine whether an
9 issue was generic, did you expand your sample in any such
10 case to determine whether a finding, whatever you call it,
11 was isolated, or whether it applied, even to other systems?
12 For example, if you found something in the component
13 cooling water system, in order to determine whether it's
14 generic, wouldn't you have to look at another system, and
15 did you do that?
16 MR. SHULMAN: There are a couple of samples of
17 major --
18 MS. WILLIAMS: Well, I gave a couple of examples
19 today. In the case of the electrical area, we still have
20 the one outstanding question, which basically gets at that
21 point on the pressure temperature ratings of the
22 instrumentation, where we want some assurance from TUGCO
23 that it is not a problem in other systems.
24 A lot in the piping analysis, we have pretty much gone
25 through all the piping analysis considering the

1 reevaluation; and then in the pipe supports, if we found
2 specific examples, and it appeared that it might be a
3 reoccuring error, it had sufficient potential impact on
4 the design, we would look further or ask TUGCO to do some
5 searches further.
6 MR. NOONAN: Maybe I could carry on. Looking at
7 Dick's wall here, when you are looking at your scope of
8 work, if there was some indication that you had to go
9 beyond that wall, or TUGCO should have gone beyond that
10 wall, how was that handled? How would that recommendation
11 be made by the Cygna people or the senior review team?
12 MS. WILLIAMS: It's all in letters, for the most
13 part, some telecons; and the review issues list, that
14 thick document is a summary of all the areas where we feel
15 that some more review is necessary.
16 MR. SHULMAN: But in a couple of cases we
17 specifically negotiated what addition we wanted to look at.
18 MS. WILLIAMS: Yes, in letters and telecons.
19 MR. STUART: That's important because it appears
20 there were some significant problems, primarily in pipe
21 stress and pipe supports. I think TUGCO expanded our
22 scope to include many other piping systems and other
23 organizations that might have similar problems.
24 I think your question relative to the electrical review,
25 although there is a generic question outstanding which

1 certainly has implications on other systems, we have not
2 yet expanded the review outside of the electrical for that
3 particular system.
4 MR. SHULMAN: But this is for the piping. For
5 the stress intensification factor, I remember specifically
6 we look at parameters that were important to us in
7 expansion, size of piping, temperature. Those obviously
8 are the ones you would want to look at to see if you had a
9 problem generically.
10 MR. NOONAN: Okay.
11 MR. SHULMAN: One other comment, I said two
12 weeks. That basically is the two weeks to review the
13 contract that the senior review team has with the project.
14 We, by then, should know what all the issues are. We want
15 to make sure they are stated and they have come out and
16 resolved them in a way that is satisfactory to us.
17 That is not the only time we are looking at. It's an
18 ongoing process which culminates in a period at the end
19 where we do a final review and sign off on it.
20 I guess that's it in terms of -- I hope it's what all
21 three of us on the senior review team feel. It's what I
22 have heard them say, is that Cygna has done a process on
23 this which is based on sound engineering judgment which
24 determines where to be a lot more rigorous and then goes
25 in those areas where we feel we have to be a lot more

1 rigorous. That's basically been the principle that we
2 have followed, basically, to make ourselves feel
3 comfortable.
4 MR. STUART: One more comment on the senior
5 review team, and that's Bob Kennedy, I believe, has
6 attended every NRC meeting up to this one. Bob's company
7 was acquired, throughout the middle of this process, and
8 the company that acquired his company had a conflict on
9 the Texas project. Because of that he had to back out.
10 Bob was here a month or so ago at one of these meetings,
11 providing his assessment of the overall process, but
12 because of that conflict can no longer participate on the
13 team.
14 I wanted to address a few items then in summary, and
15 then I have got a conclusion on this. The first is I want
16 to talk about the protocol.
17 Cygna has operated under the protocol for independent
18 assessment since the protocol has been in existence. When,
19 I might add, the project started, there was no such thing
20 as a protocol. We noticed, certainly in all of our
21 meetings, the protocol governing the independent
22 assessment contacts with utilities, vendors, et cetera,
23 was instituted, and I would say for more than a year
24 there's been a very, very rigorous following of that
25 protocol in terms of noticing of meetings, interactions

1 with TUGCO, Gibbs & Hill, CPRT, whoever else was involved
2 in the program.
3 Now, we do have occasional meetings with TUGCO where
4 they go over scope with us, which are not noticed meetings,
5 and they are concerned with schedule, scope and budget.
6 Barring that, there is no technical discussions in
7 those meetings.
8 MR. NOONAN: Dick, I would like to ask a
9 question on the protocol issue.
10 MR. STUART: Yes.
11 MR. NOONAN: Did you find it to be restrictive
12 from the standpoint Cygna had trouble getting information?
13 MR. STUART: It absolutely was restrictive, and
14 particularly in the walkdown areas; and when our engineers
15 were out doing the as built, in order to be able to
16 provide both notice for that, and to collect additional
17 information, it was a rather circuitous project to get
18 information.
19 Nonetheless, however, eventually the information does
20 arrive and we are able to do the review. It's more of an
21 inconvenience or inefficiency on the project.
22 MR. SHULMAN: I would say that wasn't the worst
23 part of it, though. I don't know the exact date, but when
24 there was a question about what the exact protocol was,
25 were dead in the water getting the information.

1 MS. WILLIAMS: There was two months in early '84
2 where we just sat still. It was a burden, because
3 everything has to be documented, everything has to be
4 transmitted to all parties. There was a lot of
5 recordkeeping which is actually useful to us in putting
6 all the problems in one place, but it was a big burden.
7 MR. SHULMAN: That period of time, I would say
8 it made it impossible for us to do our job for that period
9 of several months.
10 MR. STUART: I would say it's certainly similar
11 to the Sunshine Act. It works very well for people on the
12 outside of the process. But for people on the inside of
13 the process, I think it brings on frustrations that, in my
14 opinion, make it less than perfect for doing one's job.
15 Nonetheless, as I have said, we have complied with that.
16 I don't believe that the quality of our review has
17 suffered. I do believe it's probably taken more time and
18 cost more money than it really should.
19 I also believe that there are certainly, when it comes
20 down to the field walkdown area, a lot of inefficiencies
21 in that process. I would strongly recommend that the NRC
22 look at other ways of handling field walkdowns in
23 independent assessment programs, because it's too big of a
24 burden to try to operate under that protocol.
25 MR. NOONAN: I wonder if I could ask you to do a

1 favor then: I would like you to maybe give me some
2 comments as to how protocol can still be maintained to
3 assure independence, but make it a little bit easier for
4 you people to do your work, whoever is doing the work in
5 these kinds of things. I would like to maybe have you
6 suggest that sort of thing.
7 MR. STUART: Secondly, I think what we have
8 tried to do here today, is we had a very, very detailed
9 review. It walked through each of the phases, and in each
10 case looked both broader and deeper in areas where we
11 suspected there were problems.
12 In terms of that detailed review, I think that the --
13 in some areas, was really, really quite broad, and not
14 very deep; and specifically, I have a conclusion slide
15 which indicates that in those areas -- pipe stress, pipe
16 supports, cable trays and conduits and overall design
17 control implementation -- I believe there is probably --
18 if this is not the most thorough review in the industry,
19 the only other one I know of that might be more thorough
20 is Diablo Canyon. So it's in the class of Diablo Canyon
21 in terms of thoroughness.
22 It's also quite broad on the systems we have looked at.
23 We tried to do a complete review. Now we are looking at
24 the interaction of the various findings that we have, and
25 that interaction, I believe, will be a very, very

1 comprehensive study and look.

2 Nonetheless, there probably -- as we discussed earlier,
3 there may be some areas, just because of the limited
4 electrical and mechanical and also equipment qualification,
5 there may be some areas where a deeper look is necessary
6 because of the idiosyncracies and lack of complexity on
7 the particular systems that we looked at.

8 The senior review team, in my opinion, are really
9 Renaissance men. For those of you that know either Bob,
10 Spence -- I think most of you ought to know Spence -- and
11 Mike, they really have been around the business for a long
12 time. They have managed, most of their careers,
13 multi-discipline projects. That's what we wanted. We
14 wanted a senior review team, that when they receive an
15 issue, could say, "Practically, this is not an issue." I
16 think as Spence said earlier, it might be a noncompliance
17 of ASME code but it's not really a safety problem, because
18 we wanted their advice in that particular area, I think
19 that's important for TUGCO.

20 Likewise, when an issue is found here, but the generic
21 implications of that are here, we wanted then to look at
22 those generic implications. I think that with the
23 experience represented here, with this group, that we are
24 able to do that.

25 So, in terms of some of the questions that were asked

1 earlier relative to design control and cumulative effects,
2 I believe, throughout the process, the senior review team
3 has been doing, in essence, somewhat of a cumulative
4 effects review; probably not as disciplined as Nancy has
5 described it, but they certainly have been looking at
6 interaction of various issues, one to another.
7 The CPRT, the Comanche Peak review team, has been
8 formed recently. We have had one meeting with the CPRT
9 where we, in essence, clarified and passed on our generic
10 issues and our concerns, our outstanding questions.
11 We have an agreement with TUGCO that we will be involved
12 in the final report of CPRT ensuring that the plan to
13 resolve these issues is agreeable to us.
14 We will review that report; we will make
15 recommendations, if we think it does not satisfy a program,
16 to resolve these issues; and Texas has agreed that that
17 process will continue until there is a CPRT plan that is
18 acceptable to us.
19 At that point, addressing Darrell's first question, we
20 have agreed that we would produce our final report and
21 deliver it to Texas, the NRC, et cetera, within six weeks
22 after the completion of that process.
23 So in terms of when are we done, it's pretty close to
24 saying that the ball is in the court of CPRT, and I think
25 we do not know what their recommendations are, and I

1 presume probably we will see it when you do next week for
2 the May 8 meeting.
3 We will probably suspect that we will have some
4 involvement thereafter in the hearings, as I believe that
5 Judge Bloch will probably want to know our opinion
6 relative to this whole process.
7 In conclusion, I guess I would like to say that I
8 believe there is a very, very rigorous program that has
9 been undertaken by Cygna. I think Texas has been
10 extremely helpful and cooperative in that process. I
11 believe they are taking appropriate action to resolve the
12 issues, and I believe that the resolution of the CPRT
13 report with our sign-off will resolve the issues within
14 our scope. Thank you very much.
15 MR. NOONAN: I would like to ask if there are
16 any more questions from members of the staff regarding the
17 presentation made by Cygna today?
18 MR. TRAMMELL: Dick, I am Charlie Trammell. I
19 have a question. I am new on this thing. I want to make
20 sure what you have just said. You haven't finished the
21 report yet. You said the ball is in their court, kind of.
22 But as I heard it, you think it's still in yours. Don't
23 you have to finish your report before they can address
24 your findings?
25 MR. STUART: What we have done is we have given

1 them a tentative list of findings to date. They are in
2 two documents, one of which I believe is the one in your
3 hands.
4 MR. TRAMMELL: April 23, 1985?
5 MR. STUART: And there's also a generic letter
6 which I think is March 29, a March 29 letter, which really
7 are the genesis, if you will -- those two documents are a
8 genesis of the presentation today, which lists all of the
9 specific outstanding issues, as well as all the generic
10 issues outlined today.
11 Now, the few remaining items that we have not yet
12 transmitted to CPRT, and to Texas, are covered in one
13 slide that Nancy referred to, which are primarily
14 associated with cumulative effects and the close-out of
15 the technical reviews, in, I believe, electrical and
16 mechanical?
17 MS. WILLIAMS: Yes, those are in this document.
18 MR. STUART: So, yes, Charlie, I guess there
19 probably are several issues that still remain outstanding
20 as a part of the close-out of Phase 3 and Phase 4, but the
21 resolution of those issues, which is a program to resolve
22 those concerns, and then our sign-off on that, is what
23 still remains to be done.
24 MR. SHAO: Also, you have to transmit all the
25 root causes to TUGCO; that has not been done, right?

1 MR. STUART: Root causes of cumulative effects?
2 I would translate that, Larry, to say that problem is
3 probably going to be in the form of a breakdown in the
4 design process, or a specific organization that we think
5 might have problems that appear to be generic across the
6 review; but relative to the technical issues, I believe
7 that those two documents that I just referred to are going
8 to be encompassing close up into the 90 percent of the
9 outstanding issues.
10 MR. TRAMMELL: So this is a punch list of things
11 you found that need to be fixed?
12 MR. STUART: Absolutely.
13 MR. TRAMMELL: TUGCO knows about that?
14 MR. STUART: That's correct.
15 MR. TRAMMELL: The report Nancy was talking
16 about is a broader review of how pervasive these issues
17 might be?
18 MR. STUART: Okay, Charlie, let me give you one
19 more try. There are two documents which summarize all of
20 the issues outstanding today, the ones I have described.
21 There is a final report that will be prepared shortly
22 which will be really a compilation and a lot of detail,
23 which will look similar to those two letters that I just
24 described.
25 In addition, they will have one section that does not

1 appear in there, and that's the cumulative effect section.
2 In addition, we will probably also address in that
3 final report, or in a separate report, our buy-off on the
4 CPRT program as modified from the discussions that we have
5 with TUGCO.
6 MR. BOSNAK: Dick, has your role been defined
7 yet in what I might call a corrective action program? I
8 consider there is going to be some corrective action
9 necessary?
10 MR. STUART: Yes.
11 MR. BOSNAK: You don't have a role defined as
12 yet in that phase of the activity?
13 MR. STUART: Our only role, Bob, is to review
14 the program created by the CPRT. That's our only role in
15 corrective action.
16 MR. NORKIN: Your final slide talked about
17 design control implementation as one of the four major
18 items. I am curious as to your characterization of the
19 design control implementation, either by actually going
20 out and looking at the design control from a QA type of
21 approach, or as a spin-off from your major findings in
22 pipe stress and cable trays, conduit supports. How much
23 would you say -- what percentage of the design control
24 implementation issues come out of actually looking at
25 products such as pipe stress and pipe supports versus the

1 QA type of approach, as I characterize it rightly or
2 wrongly, just as we are going to look at design control?
3 MS. WILLIAMS: We have less findings just due to
4 the pure QA review, because for the most part they signed
5 where they are supposed to sign. They transmitted the
6 documents they were supposed to transmit. They had the
7 procedures they were supposed to have.
8 MR. NORKIN: That was important in Phase 1 and
9 Phase 2, as I understand it?
10 MS. WILLIAMS: That's right. Phase 1 and Phase
11 2 is the only place we look at the overall program to even
12 see if they have a set of procedures in place to cover all
13 the aspects of ANSI N45.2.11.
14 The second part of what you are saying, the technical
15 issues, that's what we are looking at now in light of how
16 well the design process is working, and that's what I am
17 not done with yet.
18 So we are really going to have done both aspects, take
19 the technical findings, compare that to how well the
20 process is working, because that's actual hard evidence of
21 the product that's coming out of the process. Then we
22 have already done the pure QA type of review of ANSI N45.2.11.
23 MR. CALVO: An independent evaluation that you
24 have done, to a point to determine the depth and breadth
25 of what you have done, do I have enough information now

1 here that I can make that assessment?

2 MR. STUART: Not in those two letters that you

3 have in front of you. Vince probably has it in his office,

4 though.

5 MR. NOONAN: Yes.

6 MR. STUART: Because every letter that we write

7 to TUGCO -- and I think the stack must be four or five

8 feet high by now -- we transmit a copy to the NRC, and

9 that covers completely our scope, what our concerns are in

10 each area, the types of reviews we conducted, et cetera.

11 MR. CALVO: All the details are in there?

12 MR. STUART: Yes.

13 MS. WILLIAMS: There are two final reports out

14 on the street, one for Phase 1 and 2, and one for Phase 3,

15 which also discussed scope.

16 MR. CALVO: You have what references it?

17 MS. WILLIAMS: Yes.

18 MR. NORKIN: What bothers me a little bit, maybe

19 the words "broad base" almost seem to be contradictory to

20 a lot of depth. I assume you have a lot of depth in the

21 areas that you covered. I am wondering about narrow-based

22 and tremendous depth in most areas.

23 MR. STUART: Those are my words. Let me try.

24 I think it's fairly broad in terms of its comprehensive

25 look at everything associated with a couple of systems.

1 But if the systems are not complex -- for instance, in the
2 electrical control area -- then it's relatively shallow in
3 terms of its implications across the plant. Now that is
4 what is intended by that particular statement.
5 Now, for instance, if you felt that there were some
6 problems, I would say, in the electrical area, one would
7 need to look more rigorously at a more complex electrical
8 INC system to then say, "Gee, I have looked at the worst
9 one" and extend that across the plant.
10 MR. NORKIN: When I talk about depth I mean
11 getting down to calculations and the input and the
12 assumptions. I thought I heard you say you did that.
13 MR. STUART: That we did.
14 MR. MARINOS: The RHR is not a very simple
15 system, so component cooling valve is probably the most
16 important.
17 MS. WILLIAMS: It's true, but we only did stress
18 review analysis reports and mechanics.
19 MR. MARINOS: You didn't get into the electrical --
20 MS. WILLIAMS: Only one example.
21 MR. MARINOS: Component cooling valve in one
22 circumstance.
23 MR. STUART: I want to add one more thing,
24 because it's real important. We did an extensive review
25 of the design process in the electrical area. We reviewed

1 the procedures. We went all through the group, basically,
2 that did the work. We also didn't find any significant
3 findings. I want to point that out. That's a significant
4 factor. We didn't just sit out in San Francisco and
5 review the electrical on these particular systems. We
6 routed out, if you will, the design organization that did
7 this.
8 So I want to make sure you understand that it was a
9 very, very thorough process on the particular systems that
10 we looked at.
11 MR. MARINOS: Okay.
12 MR. NOONAN: I want to respond to one comment
13 regarding the Cygna letters. Dick is right. There is
14 quite a volume of letters. It is maybe not four feet, but
15 pretty close to it.
16 We normally take the letters that have Cygna findings,
17 we always put them to the board or noticed to the board
18 and they get copies there. We do have, in the office, all
19 of the Cygna papers.
20 Any other questions from the staff? I think at this
21 time, then, I would like to offer John Beck from the
22 utility time to comment.
23 MR. BECK: Vince, thank you. As was indicated
24 earlier, we are looking forward very much to appearing
25 back in Bethesda on May 8 and going into detail with

1 regard to the design adequacy aspects of the Comanche Peak
2 response statement.
3 I should add that that response is not only going to
4 encompass concerns that evolved from the Cygna independent
5 review, but concerns that have evolved from whatever
6 source, vis-a-vis design and the adequacy of that design:
7 the ASLB proceedings, our own internal examination as well
8 as Cygna, and any staff issues that may have been raised.
9 So it's going to be a very productive working session
10 from our viewpoint, and we look forward to it.
11 MR. NOONAN: I want to point out at this point
12 in time, back in February we had a meeting with the
13 utility. We basically talked about some of the design
14 issues. This meeting on May 8 is basically a continuation
15 of that meeting. At that point in time the utility had
16 brought a lot of new people on board. They didn't have
17 the time really to become familiar with all the areas of
18 concern.
19 What we plan now is to talk to the utility team and
20 their program plan for addressing what we call design
21 issues.
22 If there's no other further questions, I would like at
23 this time to offer Kathleen Welch, representative of CASE,
24 for her comments.
25 MS. WELCH: Hi. I have a couple of quick

1 comments. Juanita Ellis asked me to come in today. I
2 used to work with her in Texas on CASE.
3 CASE is certainly glad to see that finally Comanche
4 Peak, the design and design QA questions are receiving a
5 more thorough review than had ever been done before at
6 that plant. For more than three years we have been
7 raising a number of very similar issues that Cygna has
8 looked at; and in fact in Cygna's review over the last
9 year or so they have confirmed some of the allegations
10 that Messrs. Walsh and Doyle have raised, and some of that
11 came up today.
12 It's unfortunate that Mr. Walsh, Mr. Doyle or Ms. Ellis
13 couldn't be here today to comment in more substance on
14 some of these questions.
15 But I guess I would like to make two points from my
16 observation. One is from what it seems to me, Cygna
17 really isn't looking at everything. One is that Cygna is
18 looking at some of the Walsh/Doyle allegations, some
19 portion of the Walsh/Doyle allegations, but those concerns
20 aren't being dealt with in total here. We are hopeful
21 that the NRC and other review teams and so on will look at
22 those issues elsewhere.
23 In addition, we have concerns about the scope of the
24 Cygna review. It seems to me that in a couple of areas
25 that scope seems to be fairly narrow.

1 In looking at the April 23 letter from Cygna to the
2 applicants, it appears that a lot of information, some
3 very basic information on some of the concerns, still has
4 yet to be provided to Cygna, and we wonder how this
5 process can go forward before that kind of information has
6 been provided. And we also have concerns about what
7 exactly Cygna has been authorized to look at. We feel
8 there may be some very significant limitations on what
9 they have been authorized to review. I, of course, would
10 urge you to speak with the intervenors about this issue.
11 I can't speak to the details.
12 Then I guess the second thing that really stands out is
13 that Cygna has a very long way to go before any real
14 conclusions can be made about the safety of Comanche Peak
15 and before any real conclusions can be made about whether
16 or not this plant should be licensed to operate; and just
17 looking through the presentation that Cygna gave today,
18 there is upwards of over 80 review issues outstanding, and
19 more than 50 generic questions outstanding, and only
20 somewhere around 40 issues resolved.
21 Those kinds of questions really are very striking to me.
22 I think we have a real long way to go before any
23 conclusions can be made.
24 In that light, finally, I would just like to comment
25 that over the years there have been a lot of assertions on

1 the part of the applicants that it's been either the NRC
2 staff or the licensing board or the intervenor who has
3 caused the delays in this case. I really don't think
4 that's true.
5 I think that what Cygna has found in their fairly
6 extensive review is just that the problems the plans are
7 real, they need to be looked at, and that the delays are
8 not being caused by the process or the intervenors. There
9 are real significant problems at Comanche Peak that must
10 be resolved.
11 We are hopeful that the hearing process will do that.
12 Thank you.
13 MR. NOONAN: Thank you, Ms. Welch. Are there
14 any comments of interested members of the public at this
15 meeting? Okay, with that, I think I would like to thank
16 you, Dick, and all the people from Cygna, and everyone
17 else, for participating in this meeting. Thank you very
18 much.
19 (Whereupon, at 3:52 p.m., the meeting was
20 adjourned.)
21
22
23
24
25

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TEXAS UTILITIES GENERATING CO.

Independent Assessment Program

Comanche Peak Steam Electric Station

April 26, 1985

Agenda

I.	Introduction	R. Stuart
II.	Scope, Objectives and Methodology	N. Williams
III.	Review Results	N. Williams
IV.	Senior Review Team Comments	M. Shulman
V.	Conclusion	R. Stuart

Independent Assessment Program
Scope Summary

- A multi-disciplined technical review of a portion of one train of the CCWS, and a portion of the RHR system.
- As-built verification of a portion of one train of the CCWS, portions of the Main Steam system and a portion of the Spent Fuel Pool Cooling System.
- Review of the piping and pipe support designs in portions of the Main Steam and CCWS Systems.
- Complete design control program evaluations of TUSI and Gibbs & Hill.
- Implementation evaluations of the design control program in terms of five selected design control elements.
- Program and implementation evaluation of the organization and corrective action system as they pertain to design.

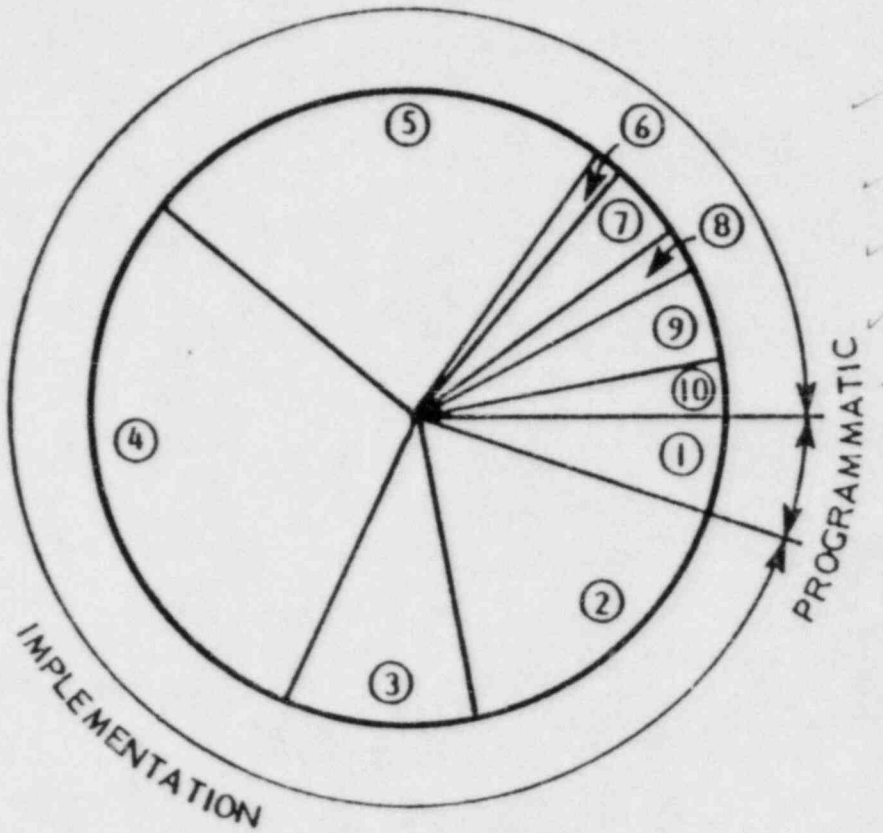
Independent Assessment Program (All Phases)

Review Attribute	Phase 1	Phase 2	Phase 3	Phase 4
PROGRAMMATIC REVIEWS (10CFR 50 APP. B)				
Criterion I - Design Organization			X	
Criterion III - Design Control	X			
Criterion XVI - Design Corrective Action			X	
DESIGN CONTROL PROGRAM IMPLMENTATION EVALUATIONS				
Interface Control	X			
Design Change Control	X			
Design Analysis Control		X		
Design Input Control				X
Design Verification				X
Design Organization			X	
Corrective Action			X	
TECHNICAL IMPLEMENTATION EVALUATIONS				
Pipe Stress		X	X	X
Pipe Supports		X	X	X
Cable Tray Supports		X		X
Conduit Supports				X
Seismic Equipment Qualification		X		
Electrical/I&E		X		X
Mechanical Systems				X
As-Built Verification	X			X

Cygna Design Review Programs

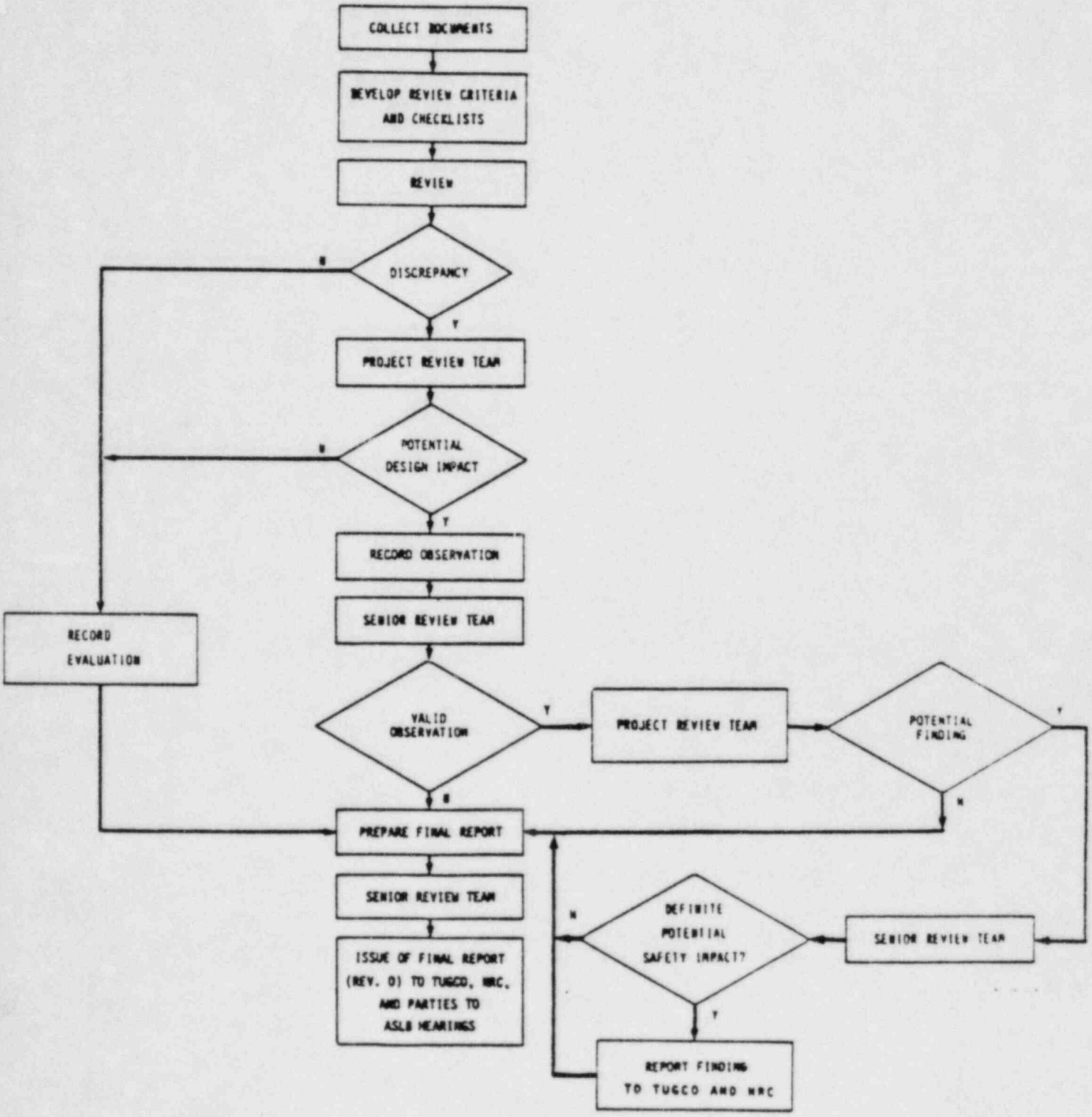
	Cygna Equivalent CPSES IAP Scope	Manhours
Grand Gulf - Unit 1	Phase 1 - 100% Phase 2 - 58% Phase 3 - 12% Phase 4 - 10%	3800
Enrico Fermi 2	Phase 1 - 100% Phase 2 - 100% Phase 3 - 12% Phase 4 - 10%	7423
Perry Nuclear Power Plant - Unit 1	Phase 1 - 0% Phase 2 - 31% Phase 3 - 0% Phase 4 - 6%	3406
Comanche Peak Steam Electric Station	----	47858

Review Manhour Distribution (All Phases)



1	Design Control Program	5%
2	Design Control Implementation	17%
3	Pipe Stress	10%
4	Pipe Supports	29%
5	Cable Tray and Conduit Supports	24%
6	Seismic Equipment Qualification	1%
7	Electrical Systems	4%
8	Mechanical Systems	2%
9	As-built Verification	5%
10	Cumulative Effects/ Design Process Evaluation	3%

IAP Process Overview



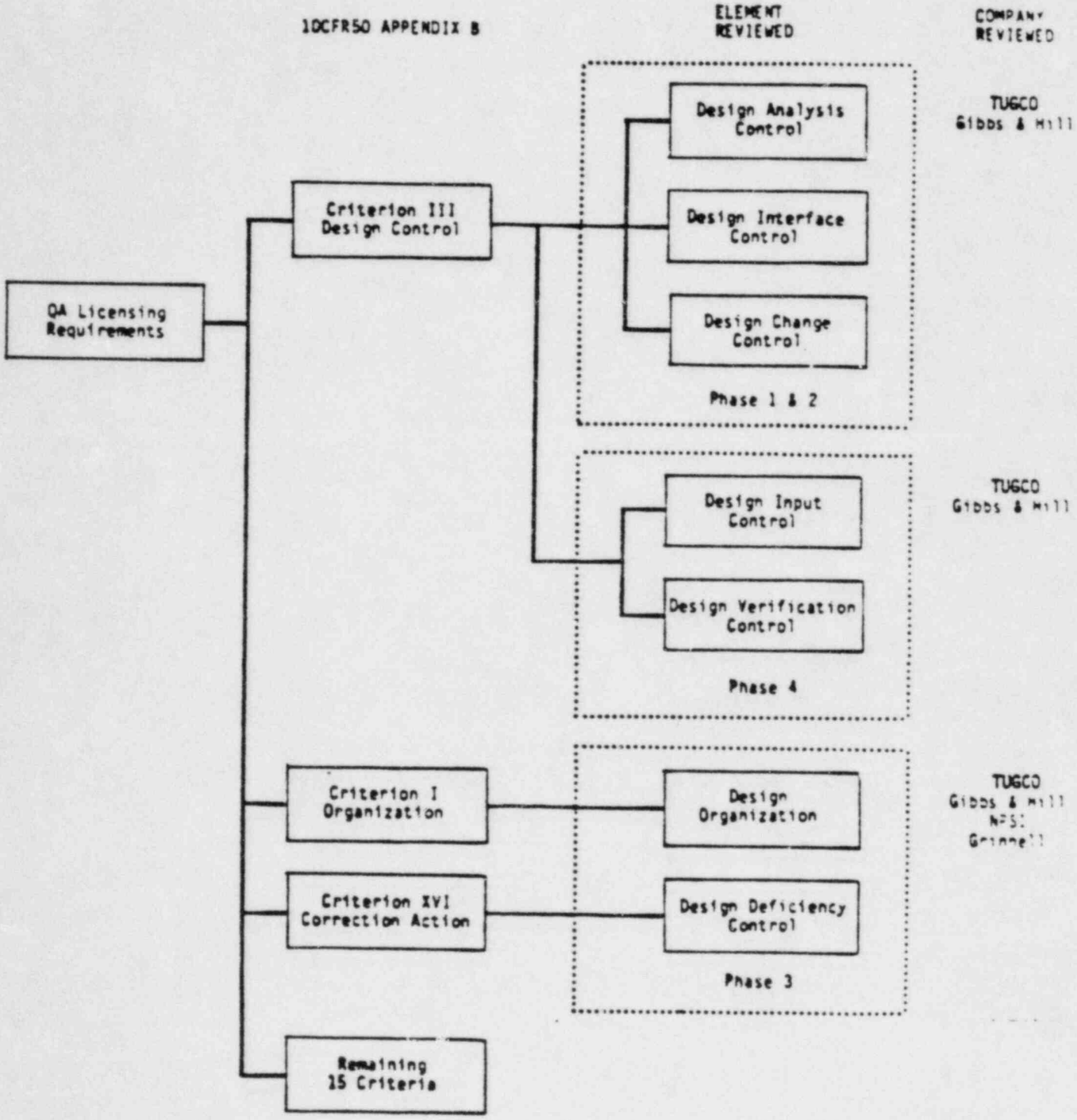
Senior Review Team

- Mike Shulman - Chairman
- Dr. Spence Bush
- Dr. Bob Kennedy
- Dr. Bob Nickell

II. Scope, Objectives and Methodology

- Design Control - All Phases
- Technical
  - Phases 1 and 2
  - Phase 3
  - Phase 4

Design Control
Total Review Scope



Independent Assessment Program (Phases 1 and 2)

- Provide supplementary evidence and additional assurance regarding the overall design quality of the Comanche Peak Steam Electric Station (CPSES).
  - Provide an assessment of the adequacy of the design control program.
  - Provide an assessment of the design adequacy of a selected system.
  - Verify a selected as-built configuration.
  - Evaluate the extent of implementation of selected design control program elements.

Implementation Evaluations (Phases 1 and 2)

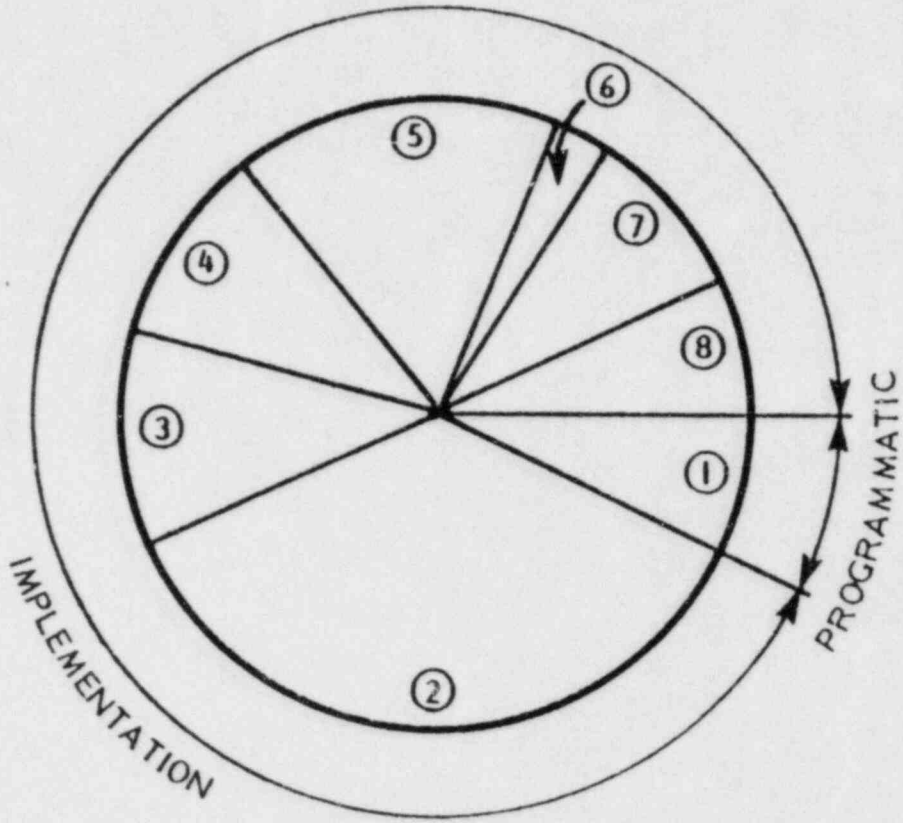
RHR/Safety Injection System - Train B

- Design
  - Review of pipe stress/flued head analysis
  - Review of pipe support design
  - Review of cable tray support structural design
  - Review electrical power supply
  - Review instrumentation and controls
  - Review seismic equipment qualification
- Design Analysis Control

Spent Fuel Pool Cooling System - Train A

- Perform As-Built Walkdown
  - Structural
  - Pipe Supports
  - Piping Layout
  - Electrical
- Internal/External Interface Control
- Design Change Control

Review Manhour Distribution (Phases 1 and 2)



1	Design Control Program	7%
2	Design Control Implementation	36%
3	Pipe Stress	11%
4	Pipe Supports	10%
5	Cable Tray Supports	17%
6	Seismic Equipment Qualification	3%
7	Electrical Systems	9%
8	As-built Verification	7%

Independent Assessment Program (Phase 3)

Perform an independent review of a system that exhibited design characteristics similar to the concerns raised during the ALSB proceedings and address concerns with portions of the design control program.

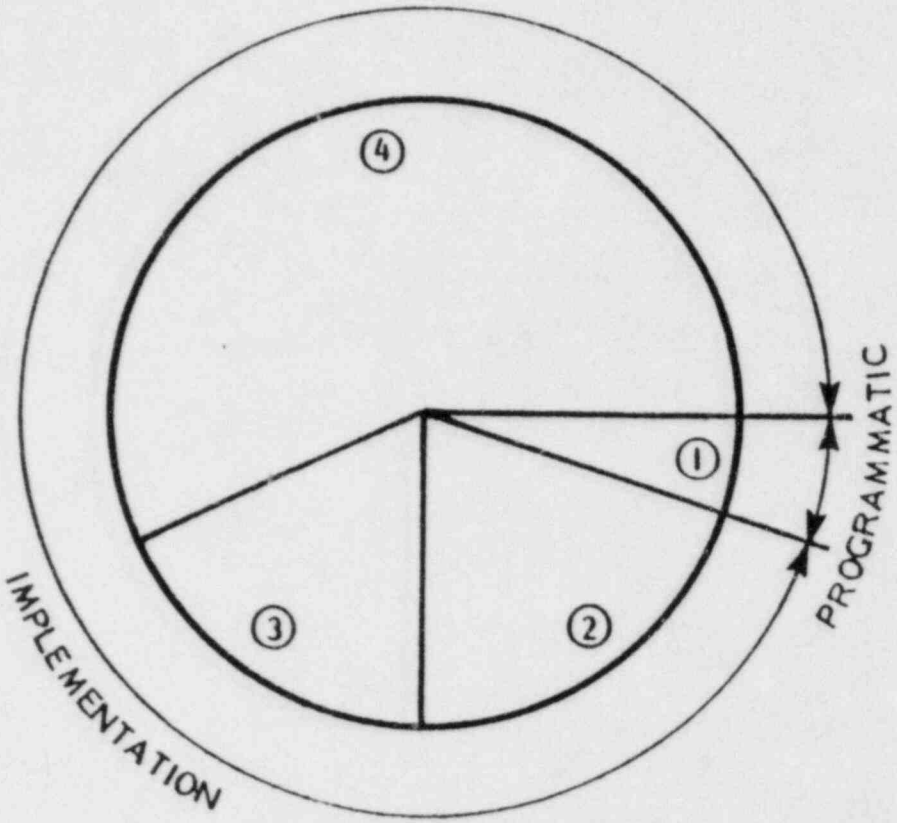
- Assess the adequacy of the piping and pipe support design.
- Assess the adequacy of the organization (Criterion I) and corrective action programs (Criterion XVI) as they pertain to design.
- Verify the adequacy of the implementation of Criteria I and XVI.

Implementation Evaluations (Phase 3)

CCW and Main Steam Systems

- Design
  - Review of pipe stress analysis
  - Review of pipe support design
- Design control
  - Organization (Criteria I)
  - Corrective action (Criteria XVI)

Review Manhour Distribution (Phase 3)



1	Design Control Program	5%
2	Design Control Implementation	20%
3	Pipe Stress	18%
4	Pipe Supports	57%

Independent Assessment Program (Phase 4)

- Perform an independent, multi-discipline review of a system.
  - Multi-discipline technical review.
  - As-built verification
  - Evaluation of the implementation of the Design Input and Design Verification Control systems.

Implementation Evaluations (Phase 4)

Component Cooling Water System

- Design
  - Review of pipe stress analysis
  - Review of pipe support design
  - Mechanical system review
  - Electrical/I&C review
  - Cable tray/conduit support design
  - As-built walkdown

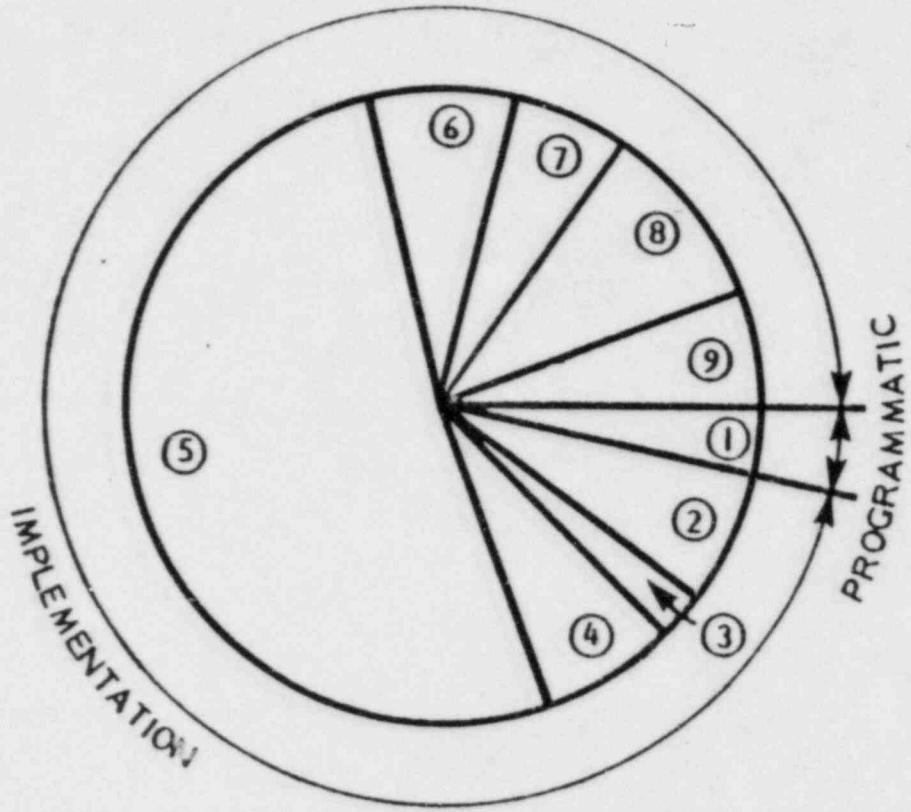
- Design control
  - Design input control
  - Design verification control

Main Steam System

- Design
  - As-built walkdown

- Design control
  - Design input control
  - Design verification control

Review Manhour Distribution (Phase 4)



1	Design Control Program	3%
2	Design Control Implementation	7%
3	Pipe Stress	2%
4	Pipe Supports	7%
5	Cable Tray and Conduit Supports	52%
6	Electrical Systems	7%
7	Mechanical Systems	6%
8	As-built Verification	10%
9	Cumulative Effects/ Design Process Evaluation	6%

Design Process Overview

- Cumulative effects data base
- Design process flow charts
- Corrective action system adequacy
- Document control center effectiveness

III. Review Results (effective 4/5/85)

- Pipe Stress
- Pipe Supports
- Cable Tray Supports
- Conduit Supports
- Electrical
- Mechanical Systems
- Design Control

Pipe Stress

- 2 generic issues
  - Mass participation
    - Compliance with FSAR
    - 30% mass participation cut-off
    - Final design documentation
  - Cumulative effects of five piping analysis observations
    - Cumulative effects
    - Effect of fluid and insulation weights at valves and flanges
    - Mass point spacing errors
    - Effect of support mass

Pipe Stress (Cont.)

- 7 generic questions outstanding
- 10 review issues outstanding
- 11 review issues resolved
- Cumulative effects review still in process

Pipe Supports

- 2 categories of generic issues
  - Design loads and displacements
    - Cumulative effects of pipe stress observations
    - Pipe support stability
    - Support load imbalance
    - Load transfer to structures
    - Effects of large displacements

Pipe Supports (Cont.)

- Design of support components
  - Spacing of embedded plate attachments
  - Requirements for welded/bolted connections
  - Design of Richmond Inserts
  - Tube steel punching shear
  - U-bolts/box frames

- 11 generic questions outstanding
- 18 review issues outstanding
- 10 review issues resolved
- Cumulative effects review still in process

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Mass Participation/Mass Point Spacing

- Original finding based on review of nine stress analyses
- Review and comment on Gibbs & Hill's evaluation plan
- Review of initial Gibbs & Hill reanalyses (September 1984)
- Review of 32 Gibbs & Hill reanalyses (November 1984)
- Review of 270 associated pipe support calculations (November 1984)
- Cygna letter 84042.021 (February 8, 1985) summarizing history, concerns and recomendations

Stress Intensification Factors (SIFs)

- Original observation based on review of nine stress analyses
- Expanded review of 32 Gibbs & Hill problems to evaluate SIFs at tapered transition joints
- Spot check of Gibbs & Hill's review of SIFs at equipment nozzles
- Expanded review of 36 Gibbs & Hill problems to evaluate SIFs at Bonney Forge Fittings
- Expanded reviews resulted in no stresses above Code allowables
- Final disposition dependent on results of mass participation reanalyses

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U-Bolts

- Walsh/Doyle Allegation
- 51 examples within Cygna review scope
- Use of cinched U-bolt in lieu of a clamp
- Line by line review of the Westinghouse test and analysis report for four combinations of U-bolts and pipes (June 1984 - March 1985)
- To verify the Westinghouse results, Cygna independently performed finite element analysis
- 4 Generic concerns (March 1985)
- 11 multi-faceted questions
- Cygna letter 84042.036 (March 25, 1985) summarizing concerns on local stress and long term effects.

Cable Tray Support

- 5 categories
  - Design loadings
    - Governing load case
    - FSAR required loads
    - Additive effects of various load considerations
    - Compliance with original design criteria
  - Response spectra analysis
    - Compliance with Reg. Guide 1.92
    - Appropriateness of analytical models
    - Appropriateness of modelling assumptions

Cable Tray Supports (Cont.)

- Generic studies
  - Effect of as-built conditions
  - Ability to bound all configurations
- Systems concept for design
  - Installed clamp types
  - Effect of tray clamp gaps
  - Self-weight excitation

Cable Tray Supports (Cont.)

- Component design
  - Impact of installation instructions
  - Base angle/plate designs
  - Safety factor for Richmond Inserts
  - Eccentric load application
  - Compliance with AISC

- 17 generic questions outstanding
- 21 review issues outstanding
- 4 review issues resolved
- Cumulative effects review still in process

Conduit Support

- 3 categories
  - Design loadings
    - Governing load case
    - FSAR required loads
    - Additive effects of various load considerations
    - LA-type support at flexible spans
    - Transverse support loads
  - Systems concept for design
    - Self-weight excitation
    - Z-clip rotations

Conduit Support (Cont.)

- Component designs
  - Impact of installation instructions
  - Base plate designs
  - Compliance with AISC
  - Unistrut component design
  - Modified catalogue components

- 12 generic questions outstanding
- 24 review issues outstanding
- 0 review issues resolved
- Cumulative effects review still in process

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Electrical

- 1 generic issue
  - Pressure-temperature ratings for installed instruments
- 1 generic question outstanding
- 1 review issue outstanding
- 3 review issues resolved
- Cumulative effects review still in process

Mechanical System

- 3 generic issues
  - Common mode failure
  - Changes in design parameters
  - Control of Appendix R modifications
- 4 generic questions outstanding
- 4 review issues outstanding
- 1 review issues resolved
- Cumulative effects review still in process

Design Control

- 2 Generic issues
  - Confidence in corrective action program
  - Document control prior to present system
- 2 generic questions outstanding
- 8 review issues outstanding
- 8 review issues resolved
- Cumulative effects and design process review still in process

IV. Senior Review Team

- Qualification of members
- Responsibilities
  - Evaluation of acceptance criteria on key issues
  - Technical review of Cygna observations
  - Evaluation of generic implications of findings
  - Sign-off on final report
- Key technical issues
- Overall evaluation of Cygna process

Senior Review Team
M.N. Shulman, Chairman

- General Manager, Cygna Energy Services
- 19 years experience in engineering mechanics; technical and management positions
- 12 years nuclear safety analysis experience at NSSS and engineering services organizations working on more than 15 nuclear plants.
- Project Manager, Mark I Retrofit Program for Nebraska Public Power District's Cooper Nuclear Station
- Project Manager, Recirculation Piping Replacement Project at Cooper Nuclear Station
- Project Manager, Seismic Return to Service Project for Sourthern California Edison's San Onofre Nuclear Generating Station
- Project Manager, SEP Leak before Break Program at San Onofre Nuclear Generating Station
- Project Engineer, I.E. Bulletin 79-14 Program for Commonwealth Edison's Dresden and Quad-Cities Plants
- Project Engine: Evaluation of Westinghouse Steam Generator Components for Main Steam Line Break, Tube Denting, and Flow Induced Vibration.

Senior Review Team (con't.)
Dr. S. H. Bush

- Consultant on materials and safety
- Major role in the synthesis of available information to develop a coherent picture of the relative roles of materials, fabrication, and nondestructive examination on the reliability of nuclear components
- Chairman and member, USNRC Advisory Committee on Reactor Safeguards
- Vice-chairman, USNRC Piping Review Committee
- Chairman, USNRC Task Group on Pipe Cracking
- Vice-chairman, USNRC PWR Pipe Crack Study Group
- Vice-chairman, USNRC Special Task Group on Stress Corrosion Cracking
- Program Chairman, U.S. Department of Energy Advisory Committee on Seismic Design
- Member, USNRC, LLNL Senior Review Committee on Seismic Safety Margins
- Chairman, Joint USNRC/PVRC Steering Committee on Implications of Flexible versus Nonflexible Designs in Nuclear Piping Systems
- Member, Senior Advisory Committee for PG&E on Diablo Canyon Seismic Interaction
- Member, Nuclear Safety Oversight Committee Review Group

Senior Review Team (con't.)
Dr. R. P. Kennedy

- 20 years experience in static and dynamic analysis plus design of special purpose civil and mechanical structures, particularly for the nuclear, petroleum and defense industries
- Consultant on seismic evaluation or design of more than 20 nuclear facilities
- Member, USNRC Senior Seismic Review Team on Seismic Reevaluation Criteria for nine of the oldest SEP nuclear plants
- Chairman, Seismic Analysis, Nuclear Structure and Materials Committee, Structures Division, ASCE
- Chairman, Seismic Analysis of Safety Class Structures Standards Committee, Technical Council on Codes and Standards, ASCE
- Co-author, Seismic Design Criteria for Alaskan Natural Gas Pipeline
- Member, Nuclear Structures and Materials Technical and Adminstrative Committee, Structures Division, ASCE
- Extensive experience in the analysis of nuclear facilities subjected to extreme dynamic loads including effects of external missile and aircraft impact, and impulsive loading resulting from loss-of-coolant accident and SRV discharge

Senior Review Team (con't.)
Dr. R. E. Nickell

- Consultant specializing in structrual dynamics, structural design, heat transfer and fluid mechanics
- Technical Specialist, Electric Power Research Institute, managing research projects in the areas of welding repair, fracture toughness of structural steels, residual stresses, piping system reliability, simplified piping design, primary pressure boundary and support structure bolting, life prediction for steam generator tubing materials and shipping cask design
- Chairman, Executive Committee, Pressure Vessels and Piping Division, ASME
- Chairman, ASME Transaction Board of Editors
- Chairman, ASME Task Group on Design, Committee on Containment Systems for Nuclear Spent Fuel and High-level Waste Transport Packagings
- Chairman, Computer Technology Committee, Pressure Vessel and Piping Division, ASME
- Chairman, Long Range Planning Task Force, ETD Subcommittee, Pressure Vessel Research Committee, Welding Research Council
- Vice-chairman, Task Force on Weld Acceptance Criteria, ETD Subcommittee, Pressure Vessel Research Committee, Welding Research Council

V. Conclusions

- TUGCO's IAP is extremely detailed in:
  - pipe stress,
  - pipe supports,
  - cable tray and conduit supports, and
  - design control implementation.
- The IAP is broad based but limited in scope in other review areas
- Cygna and the Senior Review Team believe that the IAP is a rigorous and thorough, independent technical assessment of Comanche Peak

CERTIFICATE OF OFFICIAL REPORTER

This is to certify that the attached proceedings before the UNITED STATES NUCLEAR REGULATORY COMMISSION in the matter of:

NAME OF PROCEEDING: CYGNA BRIEFING TO NRC MANAGEMENT ON COMPANCHE PEAK STEAM ELECTRIC STATION INDEPENDENT ASSESSMENT PROGRAM

DOCKET NO.:

PLACE: BETHESDA, MARYLAND

DATE: FRIDAY, APRIL 26, 1985

were held as herein appears, and that this is the original transcript thereof for the file of the United States Nuclear Regulatory Commission.

(sigt) Wendy S. Cox

(TYPED)
WENDY S. COX

Official Reporter
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Reporter's Affiliation