Docket Nos.: 50-445
and 50-446

MAY 30 1985

CENTRAL FILE ONLY

MEMORANDUM FOR: Chairman Palladino
Commissioner Roberts
Commissioner Asselstine
Commissioner Bernthal
Commissioner Zech

FROM: Vincent S. Noonan, Director
for Comanche Peak Project
Division of Licensing
Office of Nuclear Reactor Regulation

SUBJECT: BOARD NOTIFICATION - SUMMARY OF MEETING BETWEEN NRC STAFF AND CYGNA ENERGY SERVICES TO BRIEF NRC MANAGEMENT ON COMANCHE PEAK INDEPENDENT ASSESSMENT PROGRAM EFFORT (BOARD NOTIFICATION NO. 85-060)

This Notification is being provided to the Commission in accordance with the revised Commission's notification policy of July 6, 1984, to inform the Commission on all issues on the cases before the Commission.

On April 26, 1985, the NRC staff met with Cygna Energy Services (Cygna) to discuss the Independent Assessment Program (IAP), scope, objectives, methodology and review results for Comanche Peak Steam Electric Station (CPSES). Primarily Cygna's efforts focused on pipe supports, cable tray and conduit supports, design control implementation and pipe stress. Cygna also performed more limited reviews in the areas of design control program, as-built verification, electrical systems, cumulative effects/ design process evaluation, mechanical systems and seismic equipment qualification. Major issues remain open in the areas of pipe stress, pipe supports, cable tray supports, conduit supports, and mechanical systems. Other issues remain open in the electrical and design control areas. A copy of the meeting summary and transcript is provided for your information.

The parties to the proceeding are being notified by copy of this memorandum.

ORIGINAL SIGNED BY:

Vincent S. Noonan, Director
for Comanche Peak Project
Division of Licensing
Office of Nuclear Reactor Regulation

Enclosure: As stated

cc: See next page

LB#1:DL	LB#1:DL	CP:TRT:DL	CP:TRT:DL	DL
AVietti:kab	BJYoungblood	CTrammell	VNoonan	DPStark
05/ /85	05/ /85	05/ /85	05/30/85	05/ /85

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MAY 30 1985

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H. Grossman, ASLB
SECY (2)
OGC
OPE
ACRS (10)
Parties to the Proceeding
See next page
EDO

MAY 30 1985

MEETING SUMMARY DISTRIBUTION

Docket File
NRC PDR
L PDR
NSIC
PRC System
LB#1 Reading File
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*Caseload Forecast Panel Visits

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

MAY 30 1985

Docket Nos.: 50-445
and 50-446

APPLICANT: Texas Utilities Generating Company (TUGCO)

FACILITY: Comanche Peak Steam Electric Station, Units 1 and 2

SUBJECT: SUMMARY OF MEETING HELD ON APRIL 26, 1985 - FOR CYGNA TO BRIEF NRC MANAGEMENT ON COMANCHE PEAK INDEPENDENT ASSESSMENT PROGRAM EFFORT

On April 26, 1985, the NRC staff met with Cygna Energy Services to discuss the Independent Assessment Program (IAP) for Comanche Peak Steam Electric Station (CPSES). The meeting was transcribed. Attendees at the meeting and copies of all viewgraphs shown at the meeting are contained in the transcript. The meeting was primarily a briefing by Cygna Energy Services management on the CPSES IAP scope, objectives methodology and review results.

Primarily Cygna's efforts focused on pipe supports, cable tray and conduit supports, design control implementation and pipe stress. Cygna also performed more limited reviews in the areas of design control program, as-built verification electrical systems, cumulative effects/design process evaluation, mechanical systems and seismic equipment qualification. Major issues remain open in the area of pipe stress, pipe supports, cable tray supports, conduit supports and mechanical systems. Other issues remain open in the electrical and design control areas.

Annette Vietti, Project Manager
Licensing Branch No. 1
Division of Licensing

Enclosure: As stated

ORIGINAL

UNITED STATES
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)
K. GAD III	Ropes & Gray
JOHN GUIBERT	TERA Corporation

P R O C E E D I N G S

MR. EISENHUT: Let me start off. I am Darrell Eisenhut with the NRR staff. On this project, I guess it's been a couple of years now Cygna has been doing an evaluation for the Comanche Peak project. When we conceived the idea to have Cygna come in originally, it was to give a management overview of what has been going on, what work has been done, what has been found, what conclusions are there, to try to put things in perspective as a framework; and I really looked at it as a framework, from where we can go forth and continue to do our review.

So today we are going to hear from Cygna to make this presentation. The staff, quite a bit of the staff members supporting the Comanche Peak project are here, including Vince Noonan, of course, who heads the project. We are keeping a transcribed meeting today, so just as a way of formality, Vince, I am going to ask everyone to identify themselves as we go through.

This will provide a record for us to go forth from for us to be able to decide what kind of review we need to undertake in a great measure; as I said earlier, to sort of set the framework: What you have been doing, what has been found and, as important as anything else, where are you going in the longer haul? When do you see your charter has been accomplished? Not that I am trying to

discontinue it at any point, but when do you see that you are at the point where you reached the conclusions that you think are at the end of the line? That's basically the purpose as we see it here.

Vince, I turn it over to you if you plan to have any introductions or whatever.

MR. NOONAN: I don't think I will go into any real introductions. I want to make sure everybody is aware that the meeting is transcribed, and please identify yourself so the reporter has your name and what organization you are with.

At the end of the meeting, we will offer comments by representatives of CASE and also representatives of the applicant. With that, why don't you go ahead.

MR. EISENHUT: Let me qualify those really in the mode of commenting on it. I don't want this to be one of the meetings where we get in a technical dialogue. We are really here to understand what you have been doing for the last -- some time, and what have you concluded and where you are heading. So with that I will turn it over to Dick Stuart.

MR. STUART: We have got 40 or 50 transparencies which really describe the scope of our study, as well as describe some of our results in an overview form. For those of you that didn't receive them, there are booklets

around that are identical to the transparencies. The presentation will be given today by myself -- I am president of Cygna; by Nancy Williams, who is the project manager and has been on the project -- has been the project manager on this independent design assessment program since April of 1983; by Mike Shulman, who is general manager of Cygna, and also the chairman of the independent review team.

We also have the independent or senior review team here, Bob Nickell and Spence Bush, and they can comment as well on the overall program.

We are going to go through today our scope, objectives and methodology, our review results, and then some comments from the senior review team about some of the key items.

In terms of what the Independent Assessment Program scope really is, it's a combination; it's more than just a management review. I will get into chronologically how that came about in a few minutes. It's a multi-disciplined technical review of several systems. It's an as-built verification program, again, of several systems. It gets quite heavily into piping and pipe support issues; then there really are -- it's a look at design control, which I say is a management overview, and specifically was a review of Texas Utilities and Gibbs & Hill.

Finally, we look at really the implementation of the programmatic documents that really control the design process.

Breaking that down, further, in more detail, and also breaking it down into the various phases, the program is divided into four phases: Phase 1 was, in fact -- and Phase 2, were encouraged by the NRC. Phase 1 really started off as an added assurance program and Phase 2 was really an adequacy program dealing with technical issues. Now, added assurance, if you look really at the issues that were looked at, was primarily in the design control area. So it's really looking at the process of design, as opposed to getting into the design details.

Phase 2 was starting to look into design details, but more from an adequacy point of view.

A translation of what that really means is that if issues were found, they were determined by the experience of the reviewers as to whether, in fact, there would be significant safety impact of those issues. If there was not significant safety issues, then the team did not define a discrepancy of any type.

Phase 3 and Phase 4 were motivated principally by ASLB concerns and questions, and were much more extensive and much greater depth into the various review areas.

Phase 4 and into the future is continuing to look into

those areas where we see problems, it's reviewing some of the corrective action that Texas Utilities are proposing, and it's looking at the cumulative effects of several of these issues when one looks at them overall, from a systems point of view.

MR. NOONAN: Dick?

MR. STUART: Yes.

MR. NOONAN: I wondered if when you talk about the experience level of the people in this review, could you kind of expand on this a little bit, tell us some of their backgrounds; just briefly touch on their backgrounds and experience level.

MR. STUART: I would say the people that worked on this range from Ph.D.s with 20 years experience, probably down to engineers with bachelor's degree with five years experience. I don't believe we have used any technicians on the program at all. And of course it's supported by clerks who do some of the paperwork and documentation.

They are drawn from our staff, which is 350 people, and drawn from our experience base, which is roughly 10 years in the nuclear business.

These people all have been production pipe designers, production electrical designers and engineers, and production pipe support designers.

So basically they worked in various organizations, including our own, that have had these types of scopes within this industry.

Then we have supporting them senior people as needed; in some cases some consultants, senior review team members, et cetera.

MR. NOONAN: Okay.

MR. STUART: Does that answer it, Vince?

MR. NOONAN: That's fine.

MR. STUART: I want to make a comparison of this review with several others that are both qualitative and quantitative in viewpoint, because Texas Utilities' view is quite different than several of the others.

We did a review which covered primarily Phase 1 on Grand Gulf with about 3800 hours expended, and these -- really, all three of these are more in the area of added assurance or adequacy. In other words, not really going extremely deep down into the technical compliance with the ASME code, et cetera, but rather looking at it from an experience point of view and reconfirming, where we looked at Phase 1 and Phase 2 completely and very little in the equivalent of Phase 3 or 4. And then last at Perry, where there was a very, very small review done primarily in Phase 2 in adequacy.

I might add there's another variance that appears in

Grand Gulf. We expended 3800 hours, and Perry we looked at three systems with 3400 hours. The main point I would like to make is Comanche Peak is 47,858 hours through April of this year; it goes into much, much greater depth. That depth primarily occurs in Phases 3 and 4. Phase 1 and 2 are quote comparable in scope to where you see 100 percent on this chart.

In terms of the disciplines and how they break down in our review, it's like maybe a little difficult to read, so I will just point out some of the larger numbers. The largest percent of that 47,000 hours is 29 percent pipe supports, 24 percent in cable tray and conduit supports, 17 percent in design control, 10 percent in pipe stress, and the numbers fall off dramatically from there.

I would like to point out that if you look at seismic equipment qualification with 1 percent, electrical with 4 percent, mechanical systems with 2 percent, one might say that those reviews, why was the percentage so low? There are two reasons: The systems that were selected are not highly complex from either an electrical or mechanical point of view, point 1; and, secondly, in the reviews that we did, we found good compliance. There were very few problems that we discovered. So from those two points of view, it caused us not to increase our depth further in those areas.

Q This is a flow chart of the independent assessment program. For those without booklets, I will read the boxes so you understand. The first is the collection of the documents; the second is development of the review criteria and check lists; third, a review. When a discrepancy is found, it is determined whether it is a problem or not. If it's not a problem, it comes down the side here and goes into the final report.

If it is a problem, the review team continues to look further to determine a difference between a discrepancy or one with potential design impact. Now, if you follow this flow chart through, you can see that in these triangles, it points out the problem areas and increasing severity. Discrepancy, potential design impact, a valid observation, which goes into the report, as such, the final report as such. A potential finding and then as a definite potential finding. These are sort of buzzwords that are really used to subdivide the severity of the concern or observation.

MR. THADANI: I am Ashook Thadani from NRR. Can you tell us a little bit more about what you mean by potential safety impact?

MR. STUART: Nancy, do you want to define that?

MS. WILLIAMS: The "definite potential finding," as we call it, is determined at that time to require and

report it to both Texas Utilities and the NRC. We don't do the part 21 evaluation, because we don't have all of the information that would have to be done by the utility or the 5055 E. We have one set finding in all four phases.

MR. THADANI: So it really does not relate necessarily to a big safety problem, but rather perhaps ASME code requires certain things and there's a violation of whatever the requirement might be in the ASME code and so on. That's how you are using the words "safety impact"?

MS. WILLIAMS: Safety impact, yes. We are making a judgment as to whether there is any potential that the error or discrepancy would cause the component not to function or something along those lines.

But you could have a violation of the code and still not impact the functionality of the component.

MR. THADANI: Are you making that judgment on functionality?

MS. WILLIAMS: You do have to make that judgment, yes. It's all documented.

MR. THADANI: Thank you.

MR. STUART: I might add that you sort of really pointed out the difference between an adequacy review in our Phase 3 and 4 review where from an adequacy point of view there might be a minor discrepancy in the ASME code, the system is determined to be functional and safe.

I might add there are several points along this flow chart where the senior review team is brought into the process here after a potential design impact is discovered. Senior review team is brought in here, after a potential finding, and it is brought in here at the end of the review of the final report.

MR. SHAO: Dick, can you explain in more detail how you do the review? You do independent calculations or you check their calculations?

MR. STUART: Let me go back, Larry, two slides, and show you what that looks like. The answer to your question is it depends what on this chart we are doing. And in Phase 2, we would check their calculations; and Phase 1, we would check their design process to make sure their design documents were checked. And Phase 3 and Phase 4, we run independent evaluations in areas where there's not enough detail provided. If we think that there is a potential concern, we will actually run check a stress analysis.

MR. SHAO: When you say "independent," what do you mean by independent calculation?

MR. STUART: In addition to reviewing their calculations -- Gibbs & Hill, as an example -- we would run a separate calculation on our own, on our side.

MR. SHAO: Starting from scratch?

MR. STUART: Yes, starting from scratch. That's only done, however, in Phases 3 and 4, in the technical portion of the review.

This is -- as I mentioned earlier, this is our senior review team. One of the members who has acted on the senior review team is no longer active, and that's Bob Kennedy, but Dr. Bush and Dr. Nickell are here today, and Mike Shulman is going to discuss the senior review team, how it functions, what type of guidance they provide to this process, as well as the qualifications of the individuals on the team. At this point I would like to turn the presentation over to Nancy Williams, who will get into the scope, objectives and methodology results.

MS. WILLIAMS: I am going to start with an overview, as Steve said, the scope, methodology and objectives of each Phase 3 review. I will cover what the hardware scope is, and I will give you a little more detail on the programmatic reviews and implementation reviews and just what is involved with that.

As Dick mentioned, we have programmatic reviews and implementation reviews. When we speak of programmatic reviews we are speaking of the compliance of Texas Utilities or Gibbs & Hill program with ANSI N45.2.11, which is design control or the implementing document for appendix B, criterion 3.

I am going to begin with design control for all phases, and then I will break the technical review scope down by phase for you.

This diagram is intended to point out pictorially the various elements of the ANSI N45.2.11 evaluation involved.

The entire contents of all of our program deals with design, which is a key point because when we get down into talking about criteria I and XVI for appendix B, we did not cover testing and all the other portions of the program which would come under the auspices of criterion I and XVI or corrective action for testing or construction, but we did it all for design.

So through the evolution of the program, we did check that Texas Utilities and Gibbs & Hill had the necessary controls in place to fulfill the requirements of criterion III.

We later on checked Gibbs & Hill. TUGCO, NPSI and Grinnell had programs in place that complied with the requirements for organizational independence, which is criterion 1, and corrective action as it pertains to design, which is criterion XVI.

After having looked at these programs, the next thing we do is take the procedures and do a check to determine how well they are following the procedures. So first we evaluate the commitments and then we check how well they

fulfill the commitments.

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

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

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

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

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

of.

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

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

We then reviewed the seismic equipment qualification for one valve.

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

In that case we performed again a multi-discipline

walkdown and we assessed the implementation of two design control elements.

We used the documents associated from the technical reviews to check the implementation on the design control side, which is why you see design control elements associated with specific hardware.

This slide summarizes the breakdown for Phase 1 and 2 and man-hours for each of the disciplines.

As you can see, there is heavy concentration on design control in phases 1 and 2, that's box number 2 on this slide.

Phase 3 was added sometime around March of 1984, it was put together to address some of the concerns that had been raised through the hearing process. It was decided that we would again assess the adequacy of the piping and pipe supports, and we would assess the corrective action and organizational aspects of the design control program.

In order to do that the CCW or component cooling water system and main steam systems were selected. The design of piping and pipe supports only consisted of 9 stress problems and 131 pipe supports associated with those runs of pipe.

In the design control area, again, organization and corrective action as they pertain to design.

MR. NOONAN: Nancy, I wonder if you could go

into a little bit more depth as to why these systems were selected. Concerns of the staff, ASLB, how did you get that?

MS. WILLIAMS: Okay. In March of 1984, TUGCO prepared a plan in response to the December, 1983, memorandum and order from the hearing board.

As part of this plan, they wanted to address the allegations that had been made in the piping and pipe support area, and I believe they, Texas Utilities, had a consultant sit down and select those systems which exhibited the most number of characteristics which were involved in the litigation. So they wanted to have two systems that we would see examples of the problems that were being discussed in the hearing process.

We were not given a list of what those problems were. We truly went in in the independent sense, looked at the systems and gave an opinion as to not the adequacy in this case, but the letter of the law, when it comes down to meeting code requirements.

MR. NOONAN: I think the question has been asked before in previous meetings we had with you, about the Walsh/Doyle concerns. Do you now have knowledge of those concerns?

MS. WILLIAMS: There were a couple we didn't have, such as upper lateral strength, such as the

Walsh/Doyle, that we would not have been looking at as part of this program, but I think we have a pretty good handle on what all the piping and pipe support issues are.

I believe there have been maybe one other issue that we didn't see an example of. But for the most part this is a presentation available from December 20 of '84 where we discuss what those are and summarize them by group and by category and give a summary for the basis of either resolution or further review on our part.

MR. NOONAN: Okay.

MS. WILLIAMS: This is the man-hour distribution for Phase 3. As you can see, there is a lot more time spent on the pipe support than stress analysis. That's due to the sheer number of pipe supports, 131, and the number of findings and the extent to which we had to investigate the implication of some of the findings.

In the pipe stress area, we found some significant deviations or problems, but once you find it in one stress problem, it becomes very repetitive to the other stress problem, so it doesn't require quite the man-hours as individual pipe supports do.

Phase 4 was added after Phase 3 started. TUGCO submitted a revision to their plan to the hearing board, and as part of that plan, they committed to a multi-discipline review; and around May of 1984, we

submitted our plan to address that portion of TUGCO's actions that they had committed to and added on a multi-discipline review of the same disciplines, essentially, that we had done in Phase 2, only much, much greater depth.

We evaluated the implementation of design input and design verification control systems; and some aspects is still going on, and I will cover that when I get to the end of the scope description.

Both Phases 3 and 4 still have open items at this point in time.

MR. NOONAN: Are you going to address the schedule, a little bit, as to when Phase 4 comes to an end?

MS. WILLIAMS: Yes.

MR. NOONAN: As far as your overall work is concerned.

MS. WILLIAMS: The implementations for Phase 4 were done on component cooling water system and main steam design. We did a design review and checked the two design control elements, performed an as-built walkdown and we assessed the process, really, from start to finish. We had one system where we took it from design through drawings and into the field. Whereas in Phase 1 and 2 we did design on one system and we did walkdowns on another system. So although you are looking at both ends of the

process, you are not really seeing it all together. So this is our first look in depth at the whole thing straight through.

Finally, the man-hour distribution for Phase 4, and now the biggest portion is the cable tray and conduit supports to which numerous items are identified to date, and we are still pursuing various aspects of that.

MR. SHAO: Which organization did cable tray and conduit support?

MS. WILLIAMS: Gibbs & Hill.

MR. SHAO: Is it a structure group or piping group?

MS. WILLIAMS: It's a structural group. It's different from the piping group.

Let me correct one thing on this slide as well: There were no programmatic reviews in Phase 4. We only did implementation, so this slide, pieces of the pie 1 and 2 really are implementation of the design control and not programmatic.

Well, now that we have looked through all four phases, and we sit now with findings from all four phases, we sat back and said, well, what are we going to do with all this data? And within about the last month and a half, I have started a process to try and integrate all four phases worth of findings. I have taken the raw data and put it

into a data base, which is not yet done.

But the idea there is that I will be able to trend the results through organization: Every time information is transferred from one organization to another, are we seeing a problem, or is it always one group within the architect engineer who is having problems, or is it one type of design process that seems not to have sufficient control, or any trends, both across organization and within disciplines? And it covers everything that was a discrepancy in our checklist on through everything that was a definite potential finding, a very comprehensive and it's a fairly large undertaking to get it together. But we will be able to sort out about six different attributes including root cause and look for tracks.

Now parallel to that, I have developed design process flow charts for each of the disciplines and then matched the corresponding procedures for these flow charts. And the idea is that once I get the trends from the data base, I can compare those results to the way in which the work is supposed to flow, and look at the procedures which govern that flow of work and make a determination as to whether there are any weaknesses as well as strengths in the process that has been set up for the Comanche Peak project.

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

root causes today or not?

MS. WILLIAMS: It's a little premature. I know what the various root causes are, but I haven't sat back and looked at it in terms of what is the most important root cause. I can't single any out quite yet.

I would say we're probably about a month away from having this whole thing really operational and ready to talk about.

MR. NOONAN: Maybe what I would like to do at this point in time, yesterday we noticed a public meeting that will take place on the 8th of May, where we will sit with the applicant and go through his program plan for the design issues.

We are asking Cygna to come in and participate. It's going to be a working session, where we get down into some of the more technical details of these things, and staff will be setting and asking a lot of detailed questions; and what I call a real working session.

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

I don't want to do it if you are not ready, I want to make that clear, but I am looking to see if you will be prepared to do that.

MS. WILLIAMS: I think in selected instances you can do it, but I can't talk to the trends. I can't talk

to what the major root cause is.

MR. SHAO: But to me you have to know the root cause first, then you can action plan.

MS. WILLIAMS: I can't speak to any individual root causes for any finding.

MR. STUART: I think there is a misnomer going on in here. We have in the next 10 slides a list of what we perceive as being the generic issues on the Comanche Peak review.

MR. SHAO: Right.

MR. STUART: When Nancy is speaking about root cause, she is talking about the root causes of cumulative effects. So there's two different issues on the table, and it's the one, it's the root cause of cumulative effects that we are going to have to delay a month to review. But all of the technical generic issues are summarized in today's slides.

MR. SHAO: Let's say for participation, the question is what is causing this, what happened that this happened.

MR. STUART: That's what we have not completely traced through, Larry. We certainly know mass participation is a problem. You will see it on the slide.

MR. SHAO: I know; but the problem is in order to resolve the problem, you have to know why it has

happened, whether some engineer goofed or maybe the organization goofed.

MS. WILLIAMS: Well, that is exactly what this process is going to tell me. I know what I think the root cause for mass participation is today. But I could very well find out that there is a much larger problem with the training of the engineers or the adequacy of their design criteria that they are using in that group. That's when I need to stand back and look at all the errors that came out of that group and assess whether it indicates the level of expertise, the adequacy of their controlling documents, their criteria, and along those lines. So I say on an isolated basis, I can tell you what I think they are, but that's not necessarily how it's going to hold up when I put the whole picture together.

MR. STUART: We are somewhat like the NRC, Larry, in that we might look at something and a year later come up with an SER. Well, ANSI we have been looking at quite a while, but our SER is coming out in a month or so on root cause issues. We have lots of ideas. I am sure in a working group session we could sit down and discuss what we have discovered so far, but we really don't have the final conclusions yet, much like you can't issue an official position until you issue your SER.

MR. CALVO: Larry Calvo from the NRC. You just

said now in response to Larry's question, you said that you concentrated on the design control process. Do you go any farther than that, are you making any group conclusions, insofar as the terms of the adequacy of the design? It looks to me like you draw some samples of the design control process. How about adequacy, you also have root causes of that?

MS. WILLIAMS: Yes, we are. That's all part of that. That I have already done -- well, I know individually what the impact of each problem is. But cumulatively is what I am still working on.

So, for example, you will see when I get the result section that there are five pipe stress analysis problems that would affect the loads and the supports, so you have to look at those together. That's what we are still doing. In fact some of this will be wrapped up, I believe, in TUGCO's plan as well.

MR. CALVO: Are you going to extrapolate from the fact you have some problems of a certain nature with the pipe support, you had similar problems in the electrical, instrumentational mechanical disciplines? You have not yet made that cross?

MS. WILLIAMS: Exactly. Not every group does their business the same way. Just because there's problems in the pipe stress analysis does not necessarily

indicate there are problems in the electrical area. I am trying to dissect that by having a logical, well laid out process, so that you can look at it and say, Okay, I understand what Cygna's logic was going through this; I can see how they have narrowed the problem down to certain groups or certain disciplines or certain types of designs" and that kind of thing, because it's very unwieldy to get your hands around all of the findings at this point in time.

MR. NOONAN: Before you go any farther, Dick, in the section here, you are going to make the conclusions. I wonder if you could address in those conclusions, for us, the independence issue, how you maintain the independence, the protocol, those kinds of things, communications with the utility, with the NRC.

MR. STUART: Okay.

MS. WILLIAMS: Also, in addition to this, there are really two outstanding questions, one of them remaining all the way back from Phase 1.

Thus, we had a finding that the document control center was not functioning very efficiently in some cases until they implemented their new satellite system, which was about a year ago. The obvious question is what impact does that have on the designs that are complete and installed.

There is really no easy answer to that. But what I think I can do with the data is go through and determine to what extent any of our findings could be attributable to an inefficiency in that process.

So we are going to be looking towards that, anyway.

MR. CALVO: Do you feel, at this time, that you have done enough of the review, your scope was big enough, so that you can come up with some of those conclusions about the quality of the design, or do you think there may have been some areas you have been limited?

MS. WILLIAMS: In some areas it's more limited. For example, pipe stress I feel very comfortable with, because we have looked at a lot of problems and we have gotten to the point of seeing reoccuring errors. So I have a pretty good feel for the pipe stress, pretty good feel for the pipe supports by sheer number of supports and having looked at a lot of different types. Cable trays is very extensive too. You can tell from our pie charts on the man-hour distributions that they were just not that heavily emphasized.

MR. STUART: Once again, the scope, we were never really involved, too much, in the selection of the individual systems.

Rather, we were asked, will this system be representative from your point of view to look at some of

the issues, and we would say "yes."

I think the systems were negotiated between the NRC and TUGCO in terms of what would be an acceptable system for the review.

Now, in retrospect one might go back and say, looking at one valve for seismic equipment qualification, it's certainly not a representative sample of the plant, and that's all we have looked at in our scope.

Likewise, the particular systems that we looked at were not very complex in electrical and mechanical.

So there may be -- you know, someone may take a look at those systems and say, gee, we should look at some more complex systems in greater depth and those areas. That would be a determination between TUGCO and the NRC.

MR. CALVO: Excuse me, but you also can conclude that based on what you have done that you don't have sufficient bases to just go across the different systems. You have not done enough in the electrical, I don't see how you can conclude what the quality of the electrical conclusion is by looking at one valve or one motor. Also your pipe support may not be the same as electrical. You will find in some disciplines you do not have enough bases to come out with a conclusion.

MR. STUART: I don't think we can find that one valve is a representative sample. That's absolutely true.

The electrical view that we took, I think, was quite thorough, but broad, and because of the breadth of the review and because we had no findings, we didn't search deeper into the electrical area. In our view, that was adequate for the systems that we looked at. I am sure there are much more complex systems electrically where one would need to take a much deeper review.

So I think you are correct that I would be careful to try to extrapolate looking at systems that were not very complex electrically and mechanically for the entire plant.

MS. WILLIAMS: One more point on that. When I am describing this process that I am going through, it is certainly within our scope. It will be very well defined in that regard. We are not doing this matrix for the whole plant, but we are doing it to try to assimilate the results that we have through two years of reviews.

The last area that is still somewhat open, although we did a corrective action system implementation in Phase 3, I also want to stand back and look at all of the technical findings from all phases and view them in the light of whether the corrective action system should have picked them up or not.

That completes the overview of the scope and generally the extent of our reviews, for the most part.

We did look at the existing calculations, and as

previously pointed out we also did some parallel calculations for those areas where we may have disagreed with the approach or there was insufficient information.

Now I am going to cover the review results for each of the disciplines.

I am going to do it in an overview sense. I will tell you what the major generic items are. I was not intending to go into a lot of depth in them, but stop me if there is a particular one you want to talk about.

In the area of pipe stress, we have narrowed it down to two generic issues. One of them is mass participation where we have had hours and hours of lengthy discussions as to all the implications of that; our feelings on the implications are well-documented in several letters that have been written to Texas Utilities. And then the second generic issue is the cumulative effects of some of our piping analysis observations; our principal concern there being of course the effect on the pipe support load, although we are looking at the pipe stresses. But the major impact will be on support loads.

MR. SHAO: Can you tell me for the generic issue, much change in response, what is the difference in answer?

MS. WILLIAMS: Not much in pipe stress, considerable in pipe support loads. You have to compare

the load increase to the support margins to determine if they are still adequate, and it hasn't been done yet.

MR. SHAO: Do you know about the percentage increase in loading?

MS. WILLIAMS: Percentages are very deceiving. We have seen 1000 percent, but percentage you could have a 1-pound load on the support and go up 1000 percent and still not be a significant load. But we have seen significant load increases.

MR. STUART: What would the average be, Nancy?

MS. WILLIAMS: I really don't have an average number. If I were to take a guess at it, I would pick something around 40 percent.

MR. SHAO: Very good.

MS. WILLIAMS: All that data is available in charts.

MR. SHAO: It can be overestimated, it can be underestimated. It can go either way; right?

MS. WILLIAMS: That's right. Redistributed. Texas has gone in, as a result of this finding, and done some work. I have a slide on that and I will go through that where we are today on that, since it is such a big issue.

The cumulative effects, the five piping issues I am speaking of here for cumulative effects are stress

intensification factor errors, the inclusion of fluid and installation weights at valves and flanges, the mass point spacing errors, the inclusion of support mass in the stress analysis and pipe support stiffness.

In the case of the fluid and installation weights there was a study done on the RHR system. We have some questions outstanding as to the application of those results across the board.

MR. SHAO: Can you tell me, the first one, is it because they didn't use the computer code right or the computer code wasn't written right, they cut out the high frequency?

MS. WILLIAMS: For mass participation?

MR. SHAO: Yes.

MS. WILLIAMS: They have very rigid systems. They use ADL pipe version 2 C, I think it was, which at that time did not have what you refer to as the missing mass option.

Now, also in this type frame of dealing with pipe stress analysis, various AEs had ways they would counterbalance that limitation in the program by, for example, doing a static ZPA analysis and taking the envelope of the ZPA analysis to the dynamic analysis and picking the worst support load.

But because you have very stiff pipes, the program cuts

off on a displacement, and you are not getting very high displacements. So what happens is you don't get the effects of the higher order modes.

MR. SHAO: But the designers did not pick it up?

MS. WILLIAMS: No, it's not in our procedures. And the designers did not look at the results for realisticness of the support loads.

There is now a warning to that effect in the ADL pipe manual which tells you that you should not rely solely on your dynamic results for your support loads without looking at them with regard to the ZPA.

MR. NOONAN: Would you expect a designer to pick that up if he puts the computer printout on his desk and he checks the mass matrix, isn't there a generic mass matrix you can look at to check it?

MS. WILLIAMS: There are various ways you can do it. Some of the output was -- they didn't do the static ZPA analysis, which would be your easiest quick look to find out whether the results are realistic. So not having had that run output, they really didn't have -- you could still add up just as we did: We found it in their results by adding up the mass, multiplying it by ZPA, saying these loads look a little small. But the easiest way would be doing the ZPA analysis and comparing them.

MR. NOONAN: Yes.

MS. WILLIAMS: These two generic issues were broken down into seven generic questions which were in a letter dated March 29 from us to Texas Utilities trying to summarize where the major emphasis should be based in my piping reallocation programs.

These seven generic questions have been developed based upon 10 review issues, which are available in a document which is, at this point in time, upwards of about 100 pages long, which supplies all the references and bases and a description of all the specific findings that we had through the course of our review.

10 of them are outstanding and 11 of them are resolved off of that list. We refer to that as the review issues list. That's the status of it as of 4/5/85.

MR. SHAO: Let me ask a question. Does Cygna have any recommendation to TUGCO after you look at this?

MS. WILLIAMS: We have not participated in the development of the CPRT plan. I guess if we had any, once we see the plan, we might make comments on it.

In the area of pipe supports, we have grouped the issues by common effect, more or less. We have grouped them by design loads and displacements. These are issues and findings which have an effect on the design loads and displacements, and then we grouped them into individual specific problems we found with how they did the component

design on the pipe supports.

With regard to the design loads, they have to go back to the pipe stress analysis, and when considering the cumulative effects of all the discrepancies and observations in that area, justify the fact that the loads and the supports are realistic.

There is the issue of pipe support stability, which we issued a position on in February of 1985.

There is the issue of the support load imbalance which is referred to as the "rotational restraints," and the problem there is that when they had double struts or double snubbers or configurations of that nature they took the stress load, they split it in half and they sized the hardware to half of the stress load.

MR. SHULMAN: Nancy, let me interrupt. In response to Larry's question on recommendation, the one you have up there right now, pipe support stability, we have given Texas a reasonable indication of what we would find acceptable in that area and how they could --

MS. WILLIAMS: We gave them three options, but we didn't amplify them.

MR. SHULMAN: We call it a recommendation, but we certainly indicated what would be acceptable to us.

MR. SHAO: Yes.

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

mass participation.

MR. SHAO: Maybe that's beyond the scope of your work, I don't know.

MS. WILLIAMS: We have thoughts on what we think you should do. Our letters basically explain where we see the problems and what questions need to be answered in order to resolve the problem, but we don't tell them how to do it.

MR. SHAO: Maybe I can ask TUGCO, did they ask for a recommendation?

MR. BECK: John Beck. I would respond to that question, our CPRT response plan was taking into account all Cygna findings that we are aware of today and will cover all Cygna findings. Our intent is to have Cygna review the CPRT response plan. We will reiterate with Cygna to assure them and ourselves that the response plan resolves all issues that are raised by the Cygna independent review.

The "recommendations," if I could use that word in quotes, that have been included in letters of transmittal, have played a role in the development of the plant so far. A lot of this will obviously become much more clear, May 8.

MR. BOSNAK: Nancy, Bob Bosnak, NRR. Where are you covering the pipe support/pipe interface? Probably the root cause of some of the problems was that the pipe

designer and the pipe support designer never communicated. Is that part of your presentation, or is that covered someplace else?

MS. WILLIAMS: Not formally, but I can address your question, which is that one of the things I am looking at in putting together the summary of all the issues will be the fact that, just as you pointed out, the stress and the supports were separated contractually, and then there were one and two and eventually three groups doing pipe support designs.

It appears that having divided the work up in that manner, although maybe more expedient, may have caused interface problems that were much more difficult to deal with.

I am looking for those trends, as I do the cumulative effects and trending analysis.

MR. BOSNAK: Of course, it's important in any get well plan that that is taken care of and that's cured.

MR. STUART: Also, Bob, it's looked at when we look at the design process and design control. That is certainly one of the key issues that one looks at is to determine if, on the boundaries or interfaces in transfer, that's where the problems are occurring. So it was one of the very first review items I looked at, and I might add caused us to go into greater and greater depth into pipe

stress and pipe supports.

MS. WILLIAMS: At least within our organization as well we look at the stress supports and pipes together, so that I know, based on the results, whether the capabilities lie within our scope.

MR. VOLLMER: Dick Vollmer with NRR. With record to pipe stress and pipe support, you have a couple of generic category issues which I assume it's part of the design process that was done this way. Can you give me an idea why design review did not pick up any of these things in the process?

MS. WILLIAMS: That's a very good question. I am not ready to answer that because it's on my list of the design verification review, which is part of Phase 4, where we are looking at how they did their reviews, their independent reviews and verification, this iterative process that they have. This is the flow chart I was speaking of, and how the process was supposed to work versus what we actually saw when we went in and looked at it, and whether leaving all the verifications to the end of the process was a wise decision and whether or not there is any implications, having done that, and these sorts of things. There are a lot of parts to that question which aren't yet done, and they are part of the Phase 4 review.

MR. VOLLMER: You spend some time earlier on criterion XVI, corrective action. Did you find in the design process there was much in corrective action? In other words, were there design nonperformances identified in the design process as part of the original design process, or was this something that was design control, and verification really didn't point out discrepancies?

MS. WILLIAMS: We didn't see a lot of evidence of having seen design errors documented, although we did see within individual groups, mechanisms being set up that would allow input as to errors that engineers were continually seeing in this kind of thing, although it wasn't always a formal process. And a lot of the documents that we found, going through the corrective action system, were, of course, NCRs, and trending was done on NCRs. They document design deviations in their design change documentation sometimes, and we found that they did do a little trending on the design change documentation for reoccuring errors. But I need to take our technical results now, because that was a purely QA type of review, where we were looking at the paper and the procedures and the adequacy of the procedures now and see how that matches together.

Okay. So in the designs -- well, then there's the load transfer to the structures, where we were seeing some

pretty high loads on the through bolting to the civil structures, and we need to assure ourselves that, in fact, these loads have been properly accounted for and that they are in keeping with the original design assumptions for the civil structures.

The "effects of large displacements" deals with the gaps on frames for pipe supports. We have looked at this in Phase 2 for seismic; seismic displacements at Comanche Peak are very small. But we have not convinced ourselves that for the large displacement loading event, such as steam hammer and water hammer, that that is not a problem, that sufficient gap has been provided on the box frames -- not the box frames that have zero gap around them, but your standard frame for a pipe support that requires space to accommodate this movement.

Then I have a couple of specific examples, support component design discrepancies and observations that we had. For the most part, these are still open issues. We have done some evaluation on some of these ourselves, for example, the tube steel punching shear. This punching shear is not the step 2 smaller tube welded to a smaller tube. To punch through we did address that as part of the shearings. But there was an additional problem in Phase 3 where they have used tube steel and drilled holes through the opposing side and used it as backing plates to cinch

U-bolts, where we were also concerned of a similar tearing effect of the nut through the tube steel wall.

U-bolts and box frames are probably very familiar terms to most of the people here. The U-bolt analyses I am going to go into in a little bit more detail. We have done some extensive review there, and it still remains open. The box frames are a problem with the thermal growth of the pipe. We understand some modifications have been done but all of this, I believe, is going to be wrapped up in the CPRT plan. We are not quite sure what all the corrective actions are at this time.

So in total, we summarized the issues into 11 generic questions. There are 18 outstanding and 10 which have been resolved at this point in time off of the summary generic issues letter. As we just discussed, the cumulative effects is still in process.

MR. NOONAN: Nancy, can I get you to expand a little bit? When you say "resolved," can you say what that process is? How is it resolved?

MS. WILLIAMS: Let's see if I can think of an example of one that was resolved. I don't have the right letter, but "resolved" is that we have done an analysis or TUGCO has done an analysis which closes the issue out and checks for cumulative effect and extent.

MR. NOONAN: You mean if TUGCO does the analysis,

then you take -- they get it back to you? I am looking for the procedure.

MS. WILLIAMS: Sometimes we would -- there are many, many letters over the course of the last year. We would say: "We found this. Please provide supporting documentation or calculations" or what have you. They will send it. We will review it. We will sometimes ask more questions. Sometimes we will do alternate calculations as well ourselves. And then through this process we have resolved 10 issues, but you still can't lose sight of them for the cumulative effect, so that is why they are still on the list.

If you look at the review issues list, that big document, you will see some status just "closed." That is [illegible] we have arrived at sufficient information in order to resolve the particular issue.

MR. STUART: There are two major lists which govern the outstanding issues on the program: the review issues list, with pipe supports at 28 items, and the generic issue list, which is really subdivided into 11 questions. We did that for two reasons. Review issues lists often get into specificity. This particular pipe support, we found this particular problem, and really did not look at the expansion, necessarily, of those issues, out into other areas.

So in order to provide some assistance to TUGCO in knowing exactly what the issues are for CPRT resolution, where they should be looking at the generic, as well as the specific, we then created the generic issues list which are summarized here in these tables.

So, in addition to what is here, there are still 18 specific issues outstanding, which will need to be resolved as a subset of the generic resolution program of CPRT.

MR. BOSNAK: Dick or Nancy, while you are on this subject, could you describe for me what you mean by "expanded review"; what does that really mean?

MS. WILLIAMS: I have two examples coming up.

In the case of mass participation, we had reviewed nine stress problems. What we were finding was an average participation on the order of 30 to 40 percent in any one direction, and sometimes as low as zero percent. So we documented this in a letter, and Gibbs & Hill and TUGCO put together a program to study the effects to determine whether these percentages would result in any significant load increases on the pipe supports.

We then went and spot-checked their conclusions. We reviewed their plan. We made comments on it.

In most cases we are saying, no, you have really got to go in and reanalyze these problems to determine the

effects. They initiated eventually a program where they ended up reanalyzing, I believe it was approximately 205 out of a total of 271 pipe stress problems, and we went in on two different occasions and spot-checked both the stress analysis end of the implementation of the plan, and the pipe supports.

We went in and reviewed another 270 supports outside of our original pipe support review scope and checked to see if we agreed with Gibbs & Hill's and TUGCO's conclusions that it wasn't an issue, that they really didn't have to do any redesign because of it.

Right now, it is still open. There is a letter -- the letter noted down at the bottom of the slide here, February 8 of '85 -- where we gave TUGCO the results of our review; and although we don't feel there's a problem on the stress analysis side, we do feel that more work is required on the pipe support adequacy side in evaluating the effect of the load increases.

So in that case we essentially ended up extending the review well beyond the bounds of our original nine stress problems.

MR. BOSNAK: So every place we use the term "expanded review," you have documented bases to demonstrate why you feel whatever the resolution was was acceptable?

MS. WILLIAMS: That's correct.

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

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

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

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

that might be.

MS. WILLIAMS: I am at the end of supports and stress. I was going to explain the stress intensification and U-bolts. I think I am done with mass participation.

MR. STUART: There are two more slides to finish, pipe and pipe supports. That's a logical point.

MR. CHEN: Nancy, this is Paul Chen. How about loads on piping, did you look at that also?

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

MR. SHAO: Did you find any area in need of physical modification at all?

MS. WILLIAMS: Well, Gibbs & Hill's conclusion out of that study was load increases would be accommodated by existing design margins in the supports. Therefore they said "no" modifications were required.

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

MS. WILLIAMS: They were saying, for example, that if you were to look at the weak link in the support, let's just say the weld calculations, that the weld calculation was sufficiently conservatively designed such that it can handle the increased load without modifying the support. We went in and checked that for 270 supports, and we had a hard time convincing ourselves that, in fact, a rigorous enough effort had been expended in checking the

adequacy of the supports, because we found it very difficult to assemble all of the documents necessary to make those judgments.

We had a lot of difficulty with the gang hangers, because there you are talking about multiple load increases or decreases. We could not convince ourselves, based on the documentation there, that they had done a thorough review of the pipe supports and that they really were okay and did not require modification.

So as I stand here today, in my mind that's still very open.

MR. STUART: Also, Larry, what was tended to be done is not only was it not a complete look at all supports, but also when they looked at the gang supports, as an example, they would do a final reanalysis of the gang support but not get back into the various design details -- for instance, check every single weld to insure those welds were okay.

MR. SHAO: So you are essentially sharpening the evidence without seeing any criteria?

MS. WILLIAMS: We didn't see any evidence of sharpening their pencil. Someone had initialed the loads and the support as being okay. So we had to go recreate and convince ourselves from a technical standpoint that there was no technical problem, but we found enough areas

that we were questioning where there wasn't an overstress question, so we had to question them on it.

MR. STUART: I might add that TUGCO and CPRT are well aware of this issue, and are planning to accommodate that in the program that's going to be presented next week.

MS. WILLIAMS: This is stress intensification factor findings. All the way back in Phase 2, we found a problem with stress intensification factors used for the butt welds. That basically amounted to a problem with the fact that the construction specification allowed them to use 1/32nd of an inch mismatch, but stress analysis did not account for that accordingly. So there was a difference between the design assumptions and what the field was allowed to do in the construction end of the process. We ended up doing expanded review. There are several documents out in the public forum that describe our findings and resolution with regard to that.

Then we go into Phase 3 reviews and we found more problems with the stress intensification factors for tapered points and Bonney Forge fittings.

There we found omissions of the proper SIF in the stress analysis, incorrect calculations of the SIF for input to the stress analysis and other types of -- for the inconsistent errors associated with the input and use of stress intensification factors in the stress analysis.

So we did an expanded review in this case of some more pipe stress problems to evaluate the effects. And those particular expanded reviews on 36 stress problems did not result in any overstress conditions when we went in and checked the errors, but we still felt a little uncomfortable with it. So as part of the mass participation reviews documented in our mass participation letter, we have asked that they also look for the appropriateness of the stress intensification factors and go in and check that as they are doing the reevaluation for the mass participation problem.

Those prior two slides, for example, were Cygna's findings out of the review. Now I have selected one for an example. It was the Walsh/Doyle allegation that we were exposed to in our February, 1984, hearings.

We, after looking back across all reviews phases, found 51 examples of cinched U-bolts. And what they were basically doing was employing cinched U-bolts in place of a clamp to maintain positive connection between the support and the pipe, and there were many allegations raised as to the effect of a U-bolt on the local stresses of the pipe and the thermal expansion of the pipe, and finally the ability of the U-bolt to maintain its cinched condition through the operating life of the plant since it's A-36 steel which has some relaxation characteristics

associated with it.

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

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

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

(Recess.)

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

looked at the interface between Gibbs & Hill and Westinghouse?

MS. WILLIAMS: No. There was no stress analyses or piping systems in our scope where we look at Westinghouse work. The system parameters, operating temperature sort of thing, we took as givens from Westinghouse. The single equipment qualification, the valve we did, that was a Westinghouse qualification report, and that's it.

MR. NOONAN: This case here, this was a Westinghouse analysis. That's why you looked at it?

MS. WILLIAMS: Yes. This was TUGCO's answer to the allegation as the only document available for review. It happened to be that Westinghouse was contracted to do the work.

MR. NOONAN: Thank you.

MS. WILLIAMS: On to cable trays. I am going to try not to get into a lot of depth on the cable trays. I would be glad to answer your questions, but there's just an awful lot of issues hanging out there on the cable trays. I haven't totally gotten my hands around how they all interrelate to each other, but we have attempted to group the issues into five categories so that any follow-up reviews and work could be focused along the lines that would best address the majority of our concerns.

The first of the five categories is the design loadings, and there are a couple of issues out there which will affect the assumptions with the design loads that they are using. There were some assumptions made in the front end of the project that the operating basis earthquake event governs, and that creates some problems in your allowable stresses, and safety factors for components that are not allowed to have increased allowable stresses in the SSE event. Gibbs & Hill has done some response spectra analysis. The original design was predominantly an equivalent static analysis and no system models, individual support design, which is fine. But in a couple of cases they did some response spectra analysis to assess the effect of generic field deviations and things of this nature. When they have done the response spectra analysis, we have had some problems with it on the enveloping nature of the analysis, the modal combinations, closely spaced modes, and in extrapolating the results across the board.

MR. SHAO: Do you find a problem with the equivalent analysis also?

MS. WILLIAMS: Oh, yes. I will hit on some of those later also.

MR. SHAO: Okay.

MS. WILLIAMS: They have also done some generic studies -- for example, working point deviations in the

field -- and we have had some problems with the fact that there are so many design changes, pieces of paper outstanding on a given cable tray support drawing, that it's very, very difficult to assemble all of the paper when you are talking about 500 design changes on a given civil structural drawing. Then you have to narrow design -- which design changes are applicable to the given support that you are trying to review. But we did sit down, in a quite lengthy process, go through and sort all of that paper for all the drawings in our review scope.

What we found, then, was that the process that Gibbs & Hill had used in doing their generic evaluations did not properly account for all the change paper that was out against the Gibbs supports, and we are still assessing the effects of that.

They have used what we refer to as a "systems concept" for design, and there are assumptions implicit in doing that type of design where they separate out the longitudinal and transverse support systems. That's an acceptable way to do things in that it's been a practice by many AEs to do it that way. But you do have to make sure that your hardware is compatible with your design assumptions. What I am speaking of here is primarily the clamps. If you have got bolted clamps and you are saying it's not seeing a longitudinal load or vertical load,

it's probably not a realistic assumption.

MR. SHAO: The design change problem you find in the cable tray support area, do you find in pipe support too or piping or just cable tray?

MS. WILLIAMS: Not so much. They revise the pipe support drawings quite frequently. I would say that the maximum amount of design changes outstanding against a given drawing have been on the order of two per support; but we did go back and trace through all the design changes and revisions to the drawings over time to make sure that everything was properly accounted for.

Then we had some specific problems with design of particular components, using the equivalent static load method. There were some problems with the effective length for buckling, basic compliance with ASIE. They have used channel design instead of cable strut. They have to comply with ASIE. We have found different examples where that was a problem.

Because they have used channel sections, they have created another set of problems, which is that you have a lot of eccentricities. You have eccentricities associated with the placement of the load, the connection of beams to hanger members and on through up to the base connection design where they have used angled, which is another eccentricity. These things, when you start to get into

highly-stressed members, become more important.

There's a couple of members that were designed pretty close to the limit, and as a result, when you start to consider what you could construe to be minor effects in some cases or maybe in ordinary circumstances, they become more important.

The Richmond inserts is something that is also tied to an allegation: We are reviewing the documentations that are available through TUGCO on the Richmond insert testing program, the allowables for Richmond inserts and the application of the Richmond inserts at Comanche Peak. One major problem, to address some of your questions more specifically, on the equivalent static analysis they have used an amplification factor of 1.0. We have done some studies, Gibbs & Hill has done some studies. It looks like it should be something on the order of 1.14, but only for the specific case analyzed.

That is, that when they did the analysis to determine what a reasonable amplification factor was, there was assumed support spacing, there were certain assumptions that went into that which you would have to account for before you blanket apply the 1.14 factor.

MR. SHAO: NRC asks for 1.5?

MS. WILLIAMS: Yes, 1.5 or justify something less, and there was no justification.

Conduit supports is in many cases much a repeat of some of the same findings in cable tray. They were done by the same group. They have found problems in unit strut that led to some testing that is ongoing right now. Because of the type of sections, there are many of the same load problems, compliance problems and they are very similar.

MR. SHAO: Let me try to understand root cause: Why did they use 1.0, because designer is not aware of NRC requirement, or they just --

MS. WILLIAMS: That was my first reaction. I haven't seen anything that supports -- that shows me that they really thought that out. There no documentation that says they made a conscious decision to use 1.0.

We have seen other examples of their work, but this, like mass participation, seems to have slipped by. We are going to look at it in terms of a corrective action program and whether it should have been caught, but we have seen other instances in the same group where they do follow all of the NRC requirements. So this one example, we couldn't find any evidence that they made a conscious decision to use and justify 1.0, so I would have to assume that they just flat out made a mistake.

MR. VOLLMER: Dick Vollmer. I assume for these areas, many of the issues are parallel to having stress. My question on design control, and your response, would be

the same: that is, the design control, in fact, design review, is something you haven't decided upon. Why it didn't have an influence on this?

MS. WILLIAMS: Design control in cable trays?

MR. VOLLMER: Design review. Why didn't design review catch these things?

MS. WILLIAMS: The design review part is still open. I can make one comment in particular to this group, the structural group that did the cable tray supports: that's really that they didn't have procedures governing the work. That appears to be part of the problem.

MR. VOLLMER: What was their mode of design review, nominally, one of a checker?

MS. WILLIAMS: Line by line checker.

Okay. I am not going to iterate on the conduit specifics, because they are very much the same. As you can see, we have grouped them very much the same as we did the cable tray supports. The keynote here is there are 124 issues outstanding, and none of them have been closed at this point in time.

Okay. In the electrical area --

MR. SHAO: Before you leave cable tray supports, can you tell me a little bit about Gibbs & Hill pipe structure group? I mean, this is a particular group working on cable tray support or did they work on

something else?

MS. WILLIAMS: This group -- Gibbs & Hill is divided where they have a design group, which is like the structural design group. They also have a special analysis group. So whenever -- for example, building analysis: structural group needs the building analyzed, they turn to special analysis. So really we are talking about the two groups here. The structural group did the cable trays and did the conduits, then special analysis did any of the computer analyses required to support that design effort.

MR. SHAO: Is that the only component they worked on, did they work on any other components?

MS. WILLIAMS: As far as I know. I am still checking this out. This is my flow chart activity for the cumulative effects. I think they did the regular civil structures as well.

MR. STUART: I might add, Larry, I believe -- again, that's part of our review, but I believe at the point in time when the procedures were quite well known and quite well used throughout the industry for civil structural design, at that point the hanging of the cable tray supports was not a commonly standardized procedure throughout the industry. I suspect that's one of the reasons for the procedures not existing at that point in

time.

MS. WILLIAMS: On electrical, overall, it was pretty clean.

We found one instance where the pressure temperature readings for the installed equipment were different than that stated in the design documents. We checked it out, and there were no resulting problems. They just had to do with the evolution of the design and the documentation of it, essentially.

I believe it was three instruments out of 24 that we found that to be a discrepancy, but not a major discrepancy in terms of magnitude of the numbers involved.

MR. CALVO: Nancy, the electrical is only related to the RHR and component water cooling system?

MS. WILLIAMS: That's correct.

MR. CALVO: Insofar as the electrical equipment, how will you stand, how many motors do you look at or how many valves?

MS. WILLIAMS: On the RHR system we look at the control circuitry for one motor-operated valve and the power circuitry to the pump. That's all there was in the two stress problems.

MR. CALVO: The motor you looked at happened to be inside the containment or outside?

MS. WILLIAMS: Outside.

MR. CALVO: How about the component cooling water system?

MS. WILLIAMS: For the component cooling water you looked at, I think, seven valves, the power to the pump, and various instrumentation along the length of the line. Other than that, there are a lot of passive components.

MR. CALVO: You didn't go back to the source, to the diesel generators, did you go back to the motor control centers?

MS. WILLIAMS: We went back to the switch gear on the power. Once you get beyond the switch gear you are sizing, you have so many inputs; you are talking about going back to the whole plant if you want to go back to the diesel, so we had to take that as an input.

MR. STUART: I might add for all of our review, because you are looking at a system that is interconnected, we, in essence, had to draw, sort of, walls, assuming that the inputs coming in through those walls or through those interfaces were correct, and then also draw a wall on the output side, assuming where that information was passed on was also correct. Those are defined in the areas of our review.

MR. CALVO: The electrical equipment that you looked at, were there some interfaces that had to be

established between Gibbs & Hill and the electric? Would you take that, Ms. Williams.

MS. WILLIAMS: We would take the Gibbs & Hill and Westinghouse as a given and the rest was Gibbs & Hill. All the rest of the design was Gibbs & Hill.

MR. MARINOS: I am Evangelo Marinos from NRR. Did you look at the interface between the pump motor requirements, is that something you did? Was it within the scope of review of your electrical system requirements, what would be the pump requirements with regard to a motor design?

MS. WILLIAMS: Yes, we had horsepower rating and the sizing; and any mechanical systems we check the sizing of the pumps, we check the horsepower rating, we would check compatibility of the motor operator on the valve to drive the valve, this sort of thing.

MR. MARINOS: What about voltage drops?

MS. WILLIAMS: We looked at all the voltage drops, circuitry.

MR. CALVO: Were the breakers sized properly?

MS. WILLIAMS: Yes, I believe; I will have to double-check the extent we looked at that.

MR. MARINOS: You did that for one RHR motor and one cooling component motor?

MS. WILLIAMS: Yes.

MR. CALVO: I guess my question is why did you bother doing this, because you get so little and you can conclude so very little from it?

MS. WILLIAMS: We don't select the scope.

MR. STUART: That was the scope agreed upon between TUGCO and NRC, so I would ask partly how was that scope determined from your point of view.

MR. CALVO: Okay.

MS. WILLIAMS: So there is one issue outstanding, which is the implications of the pressure temperature and there are three issues that are resolved at this point in time.

The mechanical systems review, this is the area where we had the one definite potential finding where we wrote a letter and notified the Commission, as well as Texas Utilities, of a finding in this area. To the best of my knowledge, TUGCO has filed a 5055 E or at least done an interim 5055 E evaluation, which I understand that we will be getting a copy of for the common mode failure problem that we found in the CCW system.

MR. THADANI: Nancy, this is Ashook Thadani again. Can you describe what type of common mode failure you identified?

MS. WILLIAMS: It was the thermal barrier leak, which was the limiting -- in leakage to the system it was

a limiting condition. You had to isolate that, and they did not have a single failure-proof valve to isolate that event.

But I don't understand that single failure-proof criteria problem with the valve. The systems, train A and B, are cross-linked, and there's no ability to isolate them such that you could keep one train running and not drain the surge tank, which would get rid of all your makeup water for the system.

It's not necessarily a particularly difficult fix. I am not quite sure how TUGCO evaluated that, but it's still an outstanding question for us.

MR. MARINOS: Did you do flow to determine the adequacy of the design, as it was, for the component cooling or RHR, did you go that far to determine that it was a proper design?

MS. WILLIAMS: For the CCW we looked at Gibbs & Hill calculations.

MR. MARINOS: Also the transfer?

MS. WILLIAMS: The heat exchangers and in fact the component water cooling system, since it had so many interfaces with the other systems. It tends to change a lot, because design parameters change on one system, affects the CCW system. So that was probably a pretty good one for interfaces that way.

MR. MARINOS: You did independent calculations or you just checked theirs?

MS. WILLIAMS: We checked theirs.

Okay. Compared to that issue, the mechanical area, the others are fairly straightforward. One is just we are concerned about how they controlled the appendix R modifications, because one of the things that we checked was more or less a hazards review where we checked that all of the components in the system are adequately protected from various scenarios; and in this case to separate the trains, they needed a fire door between the two rooms. And at the time we went into the walkdowns and didn't have the proper UL rating. They did correct it, but we couldn't find any way these things were being tracked and controlled. That's still an outstanding question.

MR. CALVO: I thought you were only doing the design review. You also checked the as built?

MS. WILLIAMS: Yes.

MR. CALVO: You did it also for electrical system, mechanical systems?

MS. WILLIAMS: Yes, checked the wiring on MCCs, looked at the wiring in the control room, checked the train separation, walked down the cable trays.

The other one is changes in design parameters over time,

which is getting back to what I was saying. The CCW does change a lot. There were some changes that appeared inconsistent. Although it was not a problem here, we just felt that they should close the loop on the documentation of the CCW system.

The last category is design control. I have talked quite a bit, really, about the cumulative effects review, and the corrective action and the document control system prior, when I was on the section on scope and methodology. This is basically a repeat of this, indicating that this is our biggest effort we have right now aside from closing out individual technical issues, and there are eight review issues outstanding and eight that have been resolved.

Okay.

MR. SHULMAN: A brief discussion of the role of the senior review team and how we fit in. I guess one comment, in the early stages of the project, particularly Phase 1 and Phase 2, the senior review team had a different makeup that was composed of internal Cygna people, primarily from the management team. I think that's consistent with your discussion about the management overview.

As we got into Phase 3 it became apparent that we were dealing with a different animal. In addition to myself,

we felt we would need to accrue some industry-recognized experts in some of the areas that we felt were going to be the major areas of concern and the areas that we were going to scrutinize.

For that reason, we chose the people that Dick mentioned before. I would like to briefly go over our qualifications. What I think the qualifications reflect are a group of people with more years than we would care to count of significant involvement with projects of engineering design and analysis, which were very complex issues. In my case, mainly project management. In the case of the other distinguished gentlemen, quite a bit of consulting.

I think that is what is reflected on the four slides. This is mine and Spence Bush's, for those of you who don't already know Spence. Dr. Bob Kennedy, our resident dynamic analyst expert.

MR. THADANI: Is Bob Kennedy still a member of the senior review team?

MR. SHULMAN: No. His involvement ended pretty much a couple of months ago on Phase 3, pipe support and pipe support issues and dynamic analysis. Basically he is working with his current employer now.

And Bob Nickell, who is with us today as well.

What I would like to do is briefly outline the

responsibilities of the group. There are primarily four categories, what I call equalization of acceptance criteria on key issues. By that I mean what we of the senior review team, the design review group, our project, should find acceptable in resolving a given issue. We did a lot of that on the mass participation issue and Bob Kennedy played the major role there.

I think another issue that we have delved into that way is the support and stability issue, in which Bob Nickell has played the primary role.

On U-bolts, Spence Bush and myself have been involved in reviewing and determining what we would find acceptable. We were involved a lot in finding there were some questions about the final element and the mesh, how the test results correlated to what the analyses were, and raised those issues and identified what we would find acceptable; and I was talking to Larry before that, and that way I think there were, if not recommendations, indications of what we thought had to be done.

Technical review of the Cygna observations, here we looked at things like was the physical reality a problem.

There were a couple of issues where we determined that they really weren't issues in our mind. One issue that was raised was line load on a pipe from support. Well, we determined that's a local effect. Very shortly you would

have some local yielding, the stresses would dissipate and there would not be an overall integrity problem.

On the other hand on some of the finer results, we determined the meshes were not acceptable. In the case of generic implications, we asked questions -- we got back results that said, "Well, this was a problem, but it was 60 percent of allowable when we finished looking at it." We said, "Okay, what was it before you looked at it?" "Oh, it was 20, 25 percent." Well, that wasn't acceptable to us. How do I know what that's going to be in another system?

So we asked questions about how to extrapolate to other systems. We even looked at small deficiencies and small deviations and asked ourselves the question, could they be bigger on other systems? So that kind of thinking is what went on in the senior review team meetings; and on several issues and on a wide range of issues at times.

The final thing is that we have responsibility for final sign-off on the reports. In the case of Phase 4, that would be a process where we are demanding two weeks before the report goes out; during that period we will have a meeting and then do a review individually, and then sign off on the report.

That's been fairly consistent with what has gone on over the last six months, although we have increased from

one week to two weeks, because we said one week was not enough for us.

I would like to point out that a large part of our time has been spent on the key technical issues. We think that is what is important for us to be doing. I really think at this point it might be a good idea for Bob and Spence to comment on some of those technical issues and also make a statement on the evaluation of the process that they have seen at Cygna over the last six months to a year.

MR. NORKIN: May I ask one question, please? Don Norkin, INC. I have looked at the qualifications of the senior review team. I realize that INC electrical and mechanical systems did not have very much in the way of findings, but I also noticed that nobody on the senior review team seems to have any experience in those areas. Could you comment on that?

MR. SHULMAN: Well, two comments. The closest to that in synthesis in problems is Spence. As far as we could, we looked at that.

The other point is we didn't find any issue that we thought needed that kind of review. We just didn't add anybody, because we felt that the internal interface was there to make the assessment.

MR. NORKIN: Were there any issues in the electrical, for example, that came to the team for

analysis?

MS. WILLIAMS: The report is not issued.

MR. SHULMAN: That's one thing, the Phase 4 report is not issued yet.

MS. WILLIAMS: They have not reviewed the observations yet.

MR. SHULMAN: When it comes to us, we will make the determination whether we feel comfortable that's enough or we have to go out for more.

MR. STUART: But you are absolutely correct. The senior review team is primarily an engineering mechanics-based team, because that's about where 80 percent or more of the review was done.

MR. NORKIN: The question in my mind, that I can't answer right now, or shouldn't, is whether there is any comfort that the review properly proceeded in those areas, even though I hear you talking about the fact that there wasn't much to uncover in those areas. But I wonder about hard questioning, whether they did dig deeply enough in those areas that so little came out of.

I wonder whether the team would have that role to question at it.

MR. STUART: I think there are two parts to look at. You are only looking at the resumes of the senior review team. You are not looking at the resumes of the

people that did the review. About 20, 30 percent of our staff is electrical, INC personnel that have been in the industry five to 20 years.

So in terms of the actual review, they are done by people as capable -- that you run into every day.

As far as the senior review team, the level of detail that was required thus far for electrical INC review was very minimal.

MR. NORKIN: One additional question. These people that did the electrical review, for example, for the most part, did they have AE experience?

MR. STUART: Yes.

MR. SHULMAN: I think we could probably provide resumes of these people. They are very senior people.

MR. STUART: I believe they all have AE experience.

MR. NORKIN: That's all I have right now.

MR. SHULMAN: Stone and Webster, typical makeup. Bob.

DR. BUSH: I guess I approached it. I didn't entitle it in depth, but I might give an idea, I think I looked at a lot of paper that Nancy managed to send me.

I was concerned from the point of view of the adequacy of the write-up in the first place, and I am talking now what Cygna prepared: Was the position that was

established justified on the basis of the write-up, and were the actions taken on the basis of the proceeding items valid? After all, that's the bottom line.

Some was done by correspondence; a lot of it, as Mike indicated, was in face-to-face meetings.

I would say, for example, I haven't attempted to sit down and do in-depth independent calculations. I didn't visualize that as the role. I think one could in very specific areas, but at least in my case I haven't.

One of the things I was interested in, you can be in violation, but it can have trivial, if any, safety significance; so you could spend a lot of time on something that really didn't have much significance. So I tried to look at this.

One of the unfortunate problems, this is not mainly, of course, a concern with what I call the piping system and the attachments thereto. Unfortunately this isn't what I would call a forgiving piping system. It tends to be quite inflexible, and everything that happens, therefore, tends to be exaggerated. So you see this interactive effect that you have to worry about in this instance, as an example of the type of thing.

But basically a way of approach has been to talk the issues over one by one and establish whether we tend to converge or not, and if we don't, converge. I don't think

that Mike indicated it, but this is done usually by interfacing the experts. In other words, when we are sitting around there, Gordon, Burkman and others will be in to describe their end, so we can pose the questions at the time.

So there is a great deal of interaction in that respect.

MR. SHULMAN: Spence, those experts are full-time people on the Comanche Peak project.

MR. TRAMMELL: I have a general question on your sign-off on the final report. Is that the type -- in other words, what does that mean? For example, the report doesn't go out unless you like it, or the report --

MR. SHULMAN: The report doesn't go out unless we agree with it.

MR. TRAMMELL: Unless you agree with it?

MR. SHULMAN: Yes.

DR. NICKELL: I guess to follow up a little bit too, this also goes along with some of the correspondence issued to date. Many of the correspondence that identified particular technical items, we have face-to-face meetings where we draft the language, we argue out the position, we eventually reach a concurrence and then we review the actual written material before it goes out in draft form.

But I also wanted to follow up one other question.

Those of us who are on the senior review team are really supplementary to a quite high level of base line experience at Cygna already.

This is to cover this question about electrical and so forth.

The intention was to provide supplementary specialized expertise in those areas where Cygna felt there was not so much a deficiency, but perhaps the need for some additional specialized expertise.

In my particular area, that not only meant reviewing documentation, but getting fairly deeply involved in developing position papers on particular issues; and also arguing in meetings of the type that has been alluded to here, arguing about the significance of a particular issue, whether it's generic or not, and whether a resolution has been achieved or not.

I think that's what we bring -- too much experience maybe and too little hair, right, Mike?

MR. SHULMAN: Well, I don't want to say that.

DR. NICKELL: In my particular case, I think the particular areas that they wanted me to help out on were primarily in the area of pipe support stability, the issue of localized pipe stresses, especially where gaps were involved; perhaps things like bolting, where I had a heavy involvement of the bolting program at EPRI, there was some

help there; the issue of unbalanced forces and ASME code classification, a lot of the ASME code classifications crop up. I get involved in those as well. So it's primarily those areas where I try to help out, what I would call design analysis, design evaluation and engineering mechanics.

MR. SHULMAN: Yes.

MR. NORKIN: In order to determine whether an issue was generic, did you expand your sample in any such case to determine whether a finding, whatever you call it, was isolated, or whether it applied, even to other systems? For example, if you found something in the component cooling water system, in order to determine whether it's generic, wouldn't you have to look at another system, and did you do that?

MR. SHULMAN: There are a couple of samples of major --

MS. WILLIAMS: Well, I gave a couple of examples today. In the case of the electrical area, we still have the one outstanding question, which basically gets at that point on the pressure temperature ratings of the instrumentation, where we want some assurance from TUGCO that it is not a problem in other systems.

A lot in the piping analysis, we have pretty much gone through all the piping analysis considering the

reevaluation; and then in the pipe supports, if we found specific examples, and it appeared that it might be a reoccuring error, it had sufficient potential impact on the design, we would look further or ask TUGCO to do some searches further.

MR. NOONAN: Maybe I could carry on. Looking at Dick's wall here, when you are looking at your scope of work, if there was some indication that you had to go beyond that wall, or TUGCO should have gone beyond that wall, how was that handled? How would that recommendation be made by the Cygna people or the senior review team?

MS. WILLIAMS: It's all in letters, for the most part, some telecons; and the review issues list, that thick document is a summary of all the areas where we feel that some more review is necessary.

MR. SHULMAN: But in a couple of cases we specifically negotiated what addition we wanted to look at.

MS. WILLIAMS: Yes, in letters and telecons.

MR. STUART: That's important because it appears there were some significant problems, primarily in pipe stress and pipe supports. I think TUGCO expanded our scope to include many other piping systems and other organizations that might have similar problems.

I think your question relative to the electrical review, although there is a generic question outstanding which

certainly has implications on other systems, we have not yet expanded the review outside of the electrical for that particular system.

MR. SHULMAN: But this is for the piping. For the stress intensification factor, I remember specifically we look at parameters that were important to us in expansion, size of piping, temperature. Those obviously are the ones you would want to look at to see if you had a problem generically.

MR. NOONAN: Okay.

MR. SHULMAN: One other comment, I said two weeks. That basically is the two weeks to review the contract that the senior review team has with the project. We, by then, should know what all the issues are. We want to make sure they are stated and they have come out and resolved them in a way that is satisfactory to us.

That is not the only time we are looking at. It's an ongoing process which culminates in a period at the end where we do a final review and sign off on it.

I guess that's it in terms of -- I hope it's what all three of us on the senior review team feel. It's what I have heard them say, is that Cygna has done a process on this which is based on sound engineering judgment which determines where to be a lot more rigorous and then goes in those areas where we feel we have to be a lot more

rigorous. That's basically been the principle that we have followed, basically, to make ourselves feel comfortable.

MR. STUART: One more comment on the senior review team, and that's Bob Kennedy, I believe, has attended every NRC meeting up to this one. Bob's company was acquired, throughout the middle of this process, and the company that acquired his company had a conflict on the Texas project. Because of that he had to back out.

Bob was here a month or so ago at one of these meetings, providing his assessment of the overall process, but because of that conflict can no longer participate on the team.

I wanted to address a few items then in summary, and then I have got a conclusion on this. The first is I want to talk about the protocol.

Cygna nas operated under the protocol for independent assessment since the protocol has been in existence. When, I might add, the project started, there was no such thing as a protocol. We noticed, certainly in all of our meetings, the protocol governing the independent assessment contacts with utilities, vendors, et cetera, was instituted, and I would say for more than a year there's been a very, very rigorous following of that protocol in terms of noticing of meetings, interactions

with TUGCO, Gibbs & Hill, CPRT, whoever else was involved in the program.

Now, we do have occasional meetings with TUGCO where they go over scope with us, which are not noticed meetings, and they are concerned with schedule, scope and budget.

Barring that, there is no technical discussions in those meetings.

MR. NOONAN: Dick, I would like to ask a question on the protocol issue.

MR. STUART: Yes.

MR. NOONAN: Did you find it to be restrictive from the standpoint Cygna had trouble getting information?

MR. STUART: It absolutely was restrictive, and particularly in the walkdown areas; and when our engineers were out doing the as built, in order to be able to provide both notice for that, and to collect additional information, it was a rather circuitous project to get information.

Nonetheless, however, eventually the information does arrive and we are able to do the review. It's more of an inconvenience or inefficiency on the project.

MR. SHULMAN: I would say that wasn't the worst part of it, though. I don't know the exact date, but when there was a question about what the exact protocol was, were dead in the water getting the information.

MS. WILLIAMS: There was two months in early '84 where we just sat still. It was a burden, because everything has to be documented, everything has to be transmitted to all parties. There was a lot of recordkeeping which is actually useful to us in putting all the problems in one place, but it was a big burden.

MR. SHULMAN: That period of time, I would say it made it impossible for us to do our job for that period of several months.

MR. STUART: I would say it's certainly similar to the Sunshine Act. It works very well for people on the outside of the process. But for people on the inside of the process, I think it brings on frustrations that, in my opinion, make it less than perfect for doing one's job.

Nonetheless, as I have said, we have complied with that. I don't believe that the quality of our review has suffered. I do believe it's probably taken more time and cost more money than it really should.

I also believe that there are certainly when it comes down to the field walkdown area, a lot of inefficiencies in that process. I would strongly recommend that the NRC look at other ways of handling field walkdowns in independent assessment programs, because it's too big of a burden to try to operate under that protocol.

MR. NOONAN: I wonder if I could ask you to do a

favor then: I would like you to maybe give me some comments as to how protocol can still be maintained to assure independence, but make it a little bit easier for you people to do your work, whoever is doing the work in these kinds of things. I would like to maybe have you suggest that sort of thing.

MR. STUART: Secondly, I think what we have tried to do here today, is we had a very, very detailed review. It walked through each of the phases, and in each case looked both broader and deeper in areas where we suspected there were problems.

In terms of that detailed review, I think that the -- in some areas, was really, really quite broad, and not very deep; and specifically, I have a conclusion slide which indicates that in those areas -- pipe stress, pipe supports, cable trays and conduits and overall design control implementation -- I believe there is probably -- if this is not the most thorough review in the industry, the only other one I know of that might be more thorough is Diablo Canyon. So it's in the class of Diablo Canyon in terms of thoroughness.

It's also quite broad on the systems we have looked at. We tried to do a complete review. Now we are looking at the interaction of the various findings that we have, and that interaction, I believe, will be a very, very

comprehensive study and look.

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

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

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

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

earlier relative to design control and cumulative effects, I believe, throughout the process, the senior review team has been doing, in essence, somewhat of a cumulative effects review; probably not as disciplined as Nancy has described it, but they certainly have been looking at interaction of various issues, one to another.

The CPRT, the Comanche Peak review team, has been formed recently. We have had one meeting with the CPRT where we, in essence, clarified and passed on our generic issues and our concerns, our outstanding questions. We have an agreement with TUGCO that we will be involved in the final report of CPRT ensuring that the plan to resolve these issues is agreeable to us.

We will review that report; we will make recommendations, if we think it does not satisfy a program, to resolve these issues; and Texas has agreed that that process will continue until there is a CPRT plan that is acceptable to us.

At that point, addressing Darrell's first question, we have agreed that we would produce our final report and deliver it to Texas, the NRC, et cetera, within six weeks after the completion of that process.

So in terms of when are we done, it's pretty close to saying that the ball is in the court of CPRT, and I think we do not know what their recommendations are, and I

presume probably we will see it when you do next week for the May 8 meeting.

We will probably suspect that we will have some involvement thereafter in the hearings, as I believe that Judge Bloch will probably want to know our opinion relative to this whole process.

In conclusion, I guess I would like to say that I believe there is a very, very rigorous program that has been undertaken by Cygna. I think Texas has been extremely helpful and cooperative in that process. I believe they are taking appropriate action to resolve the issues, and I believe that the resolution of the CPRT report with our sign-off will resolve the issues within our scope. Thank you very much.

MR. NOONAN: I would like to ask if there are any more questions from members of the staff regarding the presentation made by Cygna today?

MR. TRAMMELL: Dick, I am Charlie Trammell. I have a question. I am new on this thing. I want to make sure what you have just said. You haven't finished the report yet. You said the ball is in their court, kind of. But as I heard it, you think it's still in yours. Don't you have to finish your report before they can address your findings?

MR. STUART: What we have done is we have given

them a tentative list of findings to date. They are in two documents, one of which I believe is the one in your hands.

MR. TRAMMELL: April 23, 1985?

MR. STUART: And there's also a generic letter which I think is March 29, a March 29 letter, which really are the genesis, if you will -- those two documents are a genesis of the presentation today, which lists all of the specific outstanding issues, as well as all the generic issues outlined today.

Now, the few remaining items that we have not yet transmitted to CPRT, and to Texas, are covered in one slide that Nancy referred to, which are primarily associated with cumulative effects and the close-out of the technical reviews, in, I believe, electrical and mechanical?

MS. WILLIAMS: Yes, those are in this document.

MR. STUART: So, yes, Charlie, I guess there probably are several issues that still remain outstanding as a part of the close-out of Phase 3 and Phase 4, but the resolution of those issues, which is a program to resolve those concerns, and then our sign-off on that, is what still remains to be done.

MR. SHAO: Also, you have to transmit all the root causes to TUGCO; that has not been done, right?

MR. STUART: Root causes of cumulative effects? I would translate that, Larry, to say that problem is probably going to be in the form of a breakdown in the design process, or a specific organization that we think might have problems that appear to be generic across the review; but relative to the technical issues, I believe that those two documents that I just referred to are going to be encompassing close up into the 90 percent of the outstanding issues.

MR. TRAMMELL: So this is a punch list of things you found that need to be fixed?

MR. STUART: Absolutely.

MR. TRAMMELL: TUGCO knows about that?

MR. STUART: That's correct.

MR. TRAMMELL: The report Nancy was talking about is a broader review of how pervasive these issues might be?

MR. STUART: Okay, Charlie, let me give you one more try. There are two documents which summarize all of the issues outstanding today, the ones I have described.

There is a final report that will be prepared shortly which will be really a compilation and a lot of detail, which will look similar to those two letters that I just described.

In addition, they will have one section that does not

appear in there, and that's the cumulative effect section.

In addition, we will probably also address in that final report, or in a separate report, our buy-off on the CPRT program as modified from the discussions that we have with TUGCO.

MR. BOSNAK: Dick, has your role been defined yet in what I might call a corrective action program? I consider there is going to be some corrective action necessary?

MR. STUART: Yes.

MR. BOSNAK: You don't have a role defined as yet in that phase of the activity?

MR. STUART: Our only role, Bob, is to review the program created by the CPRT. That's our only role in corrective action.

MR. NORKIN: Your final slide talked about design control implementation as one of the four major items. I am curious as to your characterization of the design control implementation, either by actually going out and looking at the design control from a QA type of approach, or as a spin-off from your major findings in pipe stress and cable trays, conduit supports. How much would you say -- what percentage of the design control implementation issues come out of actually looking at products such as pipe stress and pipe supports versus the

QA type of approach, as I characterize it rightly or wrongly, just as we are going to look at design control?

MS. WILLIAMS: We have less findings just due to the pure QA review, because for the most part they signed where they are supposed to sign. They transmitted the documents they were supposed to transmit. They had the procedures they were supposed to have.

MR. NORKIN: That was important in Phase 1 and Phase 2, as I understand it?

MS. WILLIAMS: That's right. Phase 1 and Phase 2 is the only place we look at the overall program to even see if they have a set of procedures in place to cover all the aspects of ANSI N45.2.11.

The second part of what you are saying, the technical issues, that's what we are looking at now in light of how well the design process is working, and that's what I am not done with yet.

So we are really going to have done both aspects, take the technical findings, compare that to how well the process is working, because that's actual hard evidence of the product that's coming out of the process. Then we have already done the pure QA type of review of ANSI N45.2.11.

MR. CALVO: An independent evaluation that you have done, to a point to determine the depth and breadth of what you have done, do I have enough information now

here that I can make that assessment?

MR. STUART: Not in those two letters that you have in front of you. Vince probably has it in his office, though.

MR. NOONAN: Yes.

MR. STUART: Because every letter that we write to TUGCO -- and I think the stack must be four or five feet high by now -- we transmit a copy to the NRC, and that covers completely our scope, what our concerns are in each area, the types of reviews we conducted, et cetera.

MR. CALVO: All the details are in there?

MR. STUART: Yes.

MS. WILLIAMS: There are two final reports out on the street, one for Phase 1 and 2, and one for Phase 3, which also discussed scope.

MR. CALVO: You have what references it?

MS. WILLIAMS: Yes.

MR. NORKIN: What bothers me a little bit, maybe the words "broad base" almost seem to be contradictory to a lot of depth. I assume you have a lot of depth in the areas that you covered. I am wondering about narrow-based and tremendous depth in most areas.

MR. STUART: Those are my words. Let me try. I think it's fairly broad in terms of its comprehensive look at everything associated with a couple of systems.

But if the systems are not complex -- for instance, in the electrical control area -- then it's relatively shallow in terms of its implications across the plant. Now that is what is intended by that particular statement.

Now, for instance, if you felt that there were some problems, I would say, in the electrical area, one would need to look more rigorously at a more complex electrical INC system to then say, "Gee, I have looked at the worst one" and extend that across the plant.

MR. NORKIN: When I talk about depth I mean getting down to calculations and the input and the assumptions. I thought I heard you say you did that.

MR. STUART: That we did.

MR. MARINOS: The RHR is not a very simple system, so component cooling valve is probably the most important.

MS. WILLIAMS: It's true, but we only did stress review analysis reports and mechanics.

MR. MARINOS: You didn't get into the electrical --

MS. WILLIAMS: Only one example.

MR. MARINOS: Component cooling valve in one circumstance.

MR. STUART: I want to add one more thing, because it's real important. We did an extensive review of the design process in the electrical area. We reviewed

the proce[illegible]s. We went all through the group, basically, that did the work. We also didn't find any significant findings. I want to point that out. That's a significant factor. We didn't just sit out in San Francisco and review the electrical on these particular systems. We routed out, if you will, the design organization that did this.

So I want to make sure you understand that it was a very, very thorough process on the particular systems that we looked at.

MR. MARINOS: Okay.

MR. NOONAN: I want to respond to one comment regarding the Cygna letters. Dick is right. There is quite a volume of letters. It is maybe not four feet, but pretty close to it.

We normally take the letters that have Cygna findings, we always put them to the board or noticed to the board and they get copies there. We do have, in the office, all of the Cygna papers.

Any other questions from the staff? I think at this time, then, I would like to offer John Beck from the utility time to comment.

MR. BECK: Vince, thank you. As was indicated earlier, we are looking forward very much to appearing back in Bethesda on May 8 and going into detail with

regard to the design adequacy aspects of the Comanche Peak response statement.

I should add that that response is not only going to encompass concerns that evolved from the Cygna independent review, but concerns that have evolved from whatever source, vis-a-vis design and the adequacy of that design: the ASLB proceedings, our own internal examination as well as Cygna, and any staff issues that may have been raised.

So it's going to be a very productive working session from our viewpoint, and we look forward to it.

MR. NOONAN: I want to point out at this point in time, back in February we had a meeting with the utility. We basically talked about some of the design issues. This meeting on May 8 is basically a continuation of that meeting. At that point in time the utility had brought a lot of new people on board. They didn't have the time really to become familiar with all the areas of concern.

What we plan now is to talk to the utility team and their program plan for addressing what we call design issues.

If there's no other further questions, I would like at this time to offer Kathleen Welch, representative of CASE, for her comments.

MS. WELCH: Hi. I have a couple of quick

comments. Juanita Ellis asked me to come in today. I used to work with her in Texas on CASE.

CASE is certainly glad to see that finally Comanche Peak, the design and design QA questions are receiving a more thorough review than had ever been done before at that plant. For more than three years we have been raising a number of very similar issues that Cygna has looked at; and in fact in Cygna's review over the last year or so they have confirmed some of the allegations that Messrs. Walsh and Doyle have raised, and some of that came up today.

It's unfortunate that Mr. Walsh, Mr. Doyle or Ms. Ellis couldn't be here today to comment in more substance on some of these questions.

But I guess I would like to make two points from my observation. One is from what it seems to me, Cygna really isn't looking at everything. One is that Cygna is looking at some of the Walsh/Doyle allegations, some portion of the Walsh/Doyle allegations, but those concerns aren't being dealt with in total here. We are hopeful that the NRC and other review teams and so on will look at those issues elsewhere.

In addition, we have concerns about the scope of the Cygna review. It seems to me that in a couple of areas that scope seems to be fairly narrow.

In looking at the April 23 letter from Cygna to the applicants, it appears that a lot of information, some very basic information on some of the concerns, still has yet to be provided to Cygna, and we wonder how this process can go forward before that kind of information has been provided. And we also have concerns about what exactly Cygna has been authorized to look at. We feel there may be some very significant limitations on what they have been authorized to review. I, of course, would urge you to speak with the intervenors about this issue. I can't speak to the details.

Then I guess the second thing that really stands out is that Cygna has a very long way to go before any real conclusions can be made about the safety of Comanche Peak and before any real conclusions can be made about whether or not this plant should be licensed to operate; and just looking through the presentation that Cygna gave today, there is upwards of over 80 review issues outstanding, and more than 50 generic questions outstanding, and only somewhere around 40 issues resolved.

Those kinds of questions really are very striking to me. I think we have a real long way to go before any conclusions can be made.

In that light, finally, I would just like to comment that over the years there have been a lot of assertions on

the part of the applicants that it's been either the NRC staff or the licensing board or the intervenor who has caused the delays in this case. I really don't think that's true.

I think that what Cygna has found in their fairly extensive review is just that the problems the plans are real, they need to be looked at, and that the delays are not being caused by the process or the intervenors. There are real significant problems at Comanche Peak that must be resolved.

We are hopeful that the hearing process will do that. Thank you.

MR. NOONAN: Thank you, Ms. Welch. Are there any comments of interested members of the public at this meeting? Okay, with that, I think I would like to thank you, Dick, and all the people from Cygna, and everyone else, for participating in this meeting. Thank you very much.

(Whereupon, at 3:52 p.m., the meeting was adjourned.)

CYGNA

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.

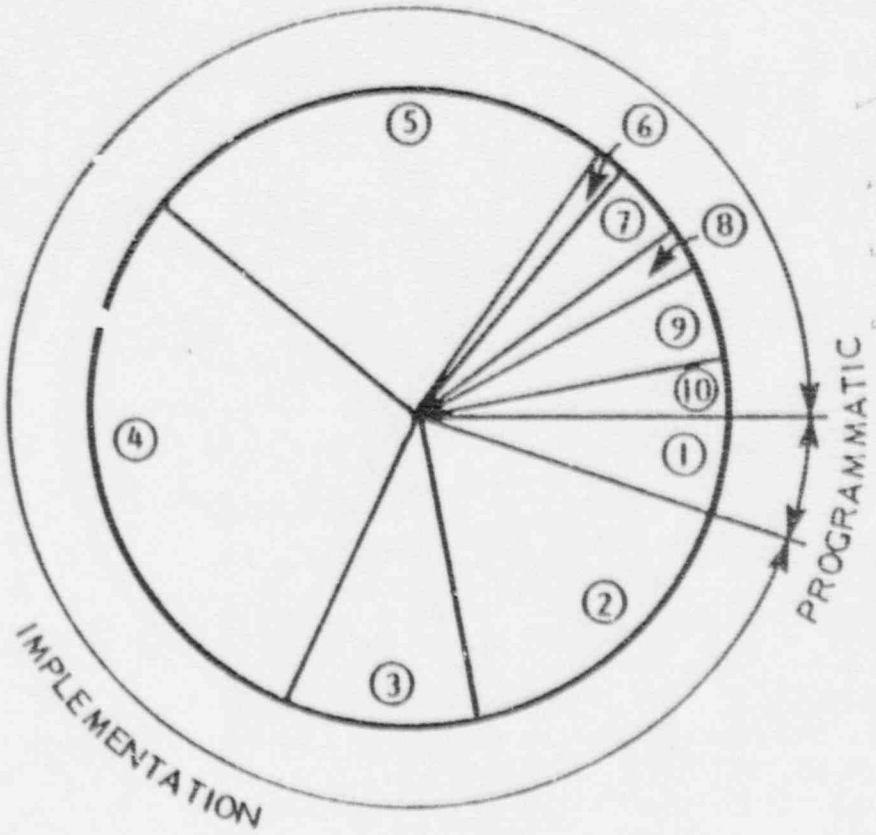
Independent Assessment Program (All Phases)

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

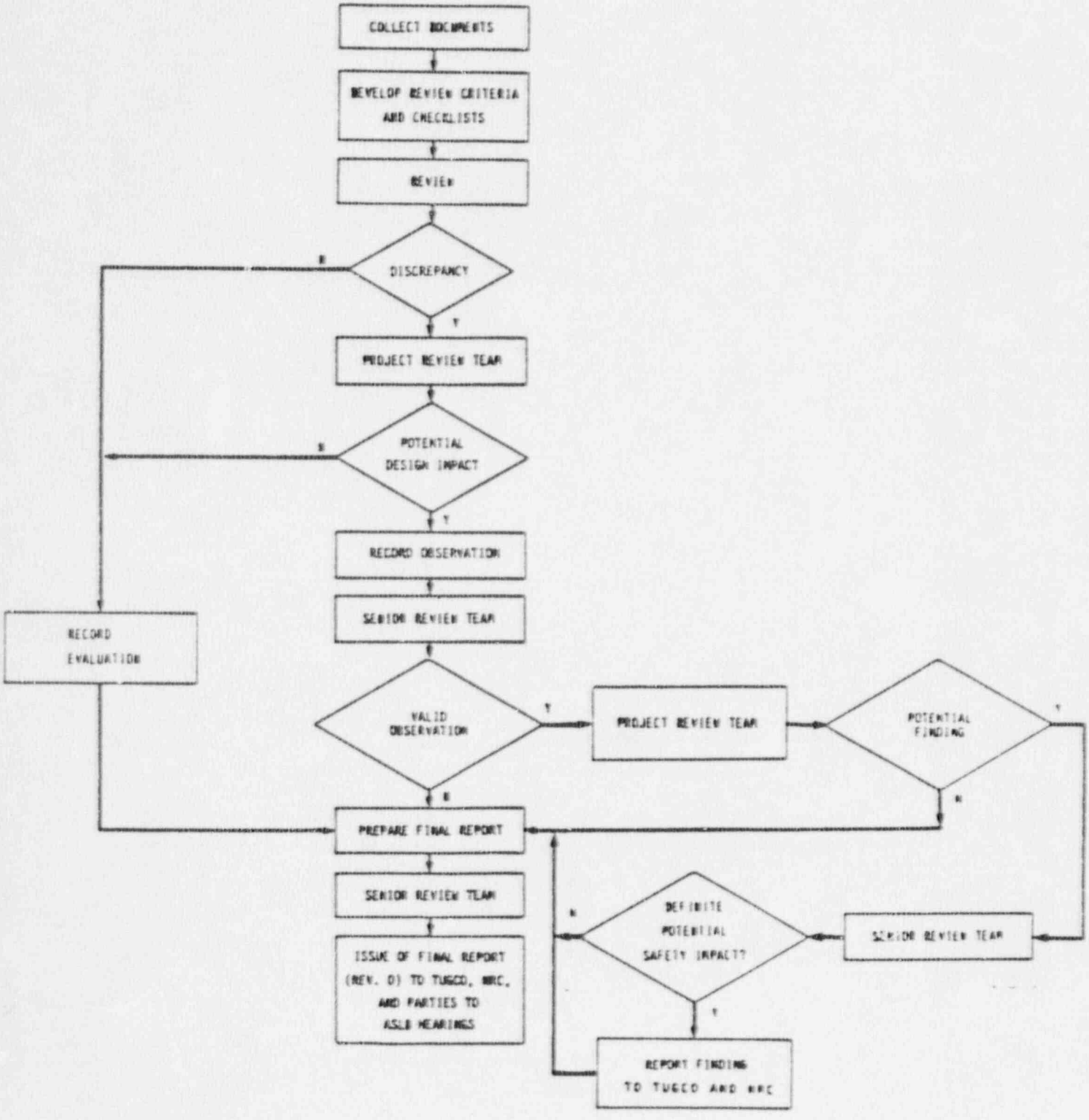
	Cygna Equivalent CPSES IAP Scope	Manhours
Grand Gulf - Unit 1	Phase 1 - 100% Phase 2 - 58% Phase 3 - 12% Phase 4 - 10%	3800
Enrico Fermi 2	Phase 1 - 100% Phase 2 - 100% Phase 3 - 12% Phase 4 - 10%	7423
Perry Nuclear Power Plant - Unit 1	Phase 1 - 0% Phase 2 - 31% Phase 3 - 0% Phase 4 - 6%	3406
Comanche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



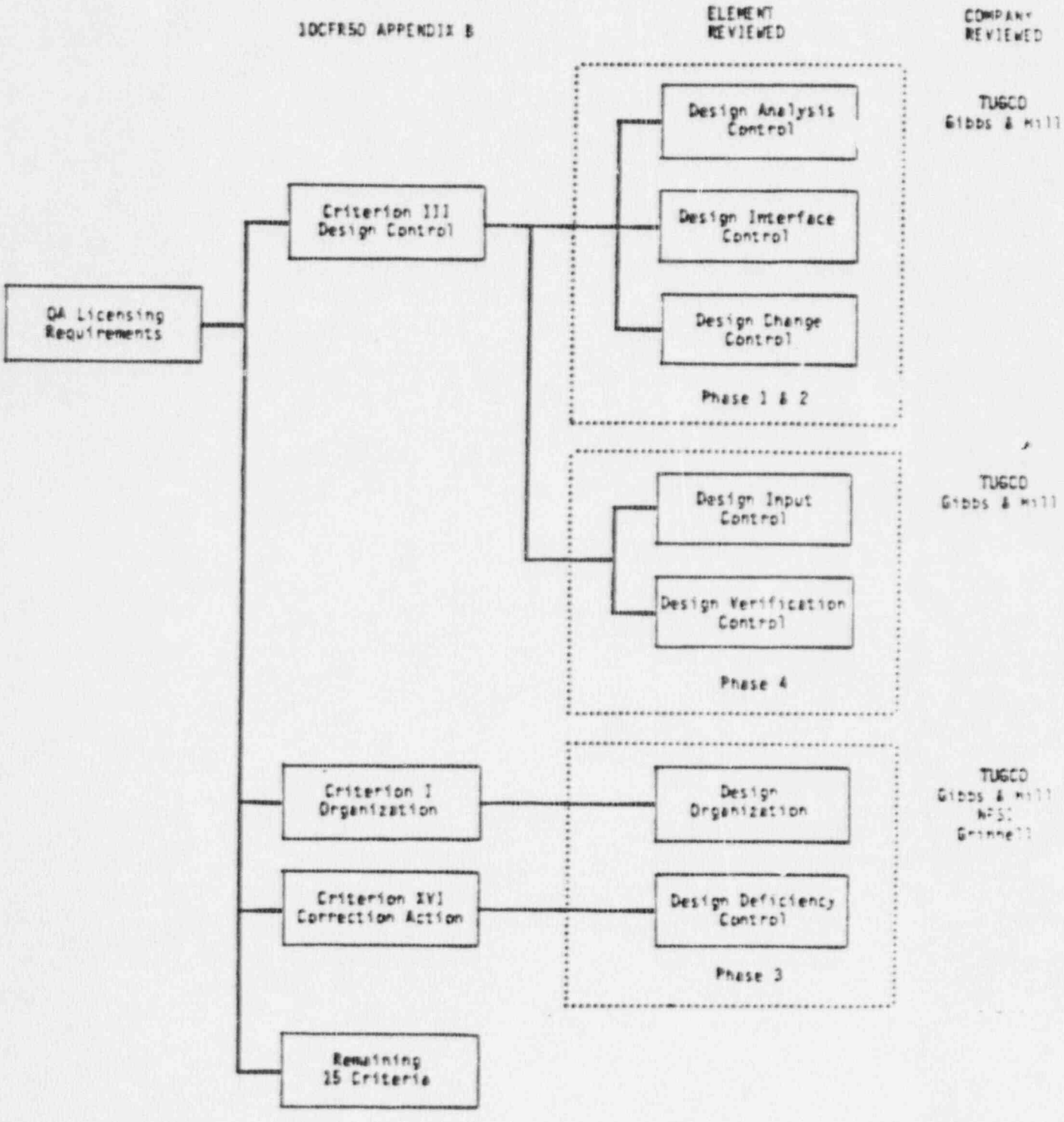
Senior Review Team

- 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)

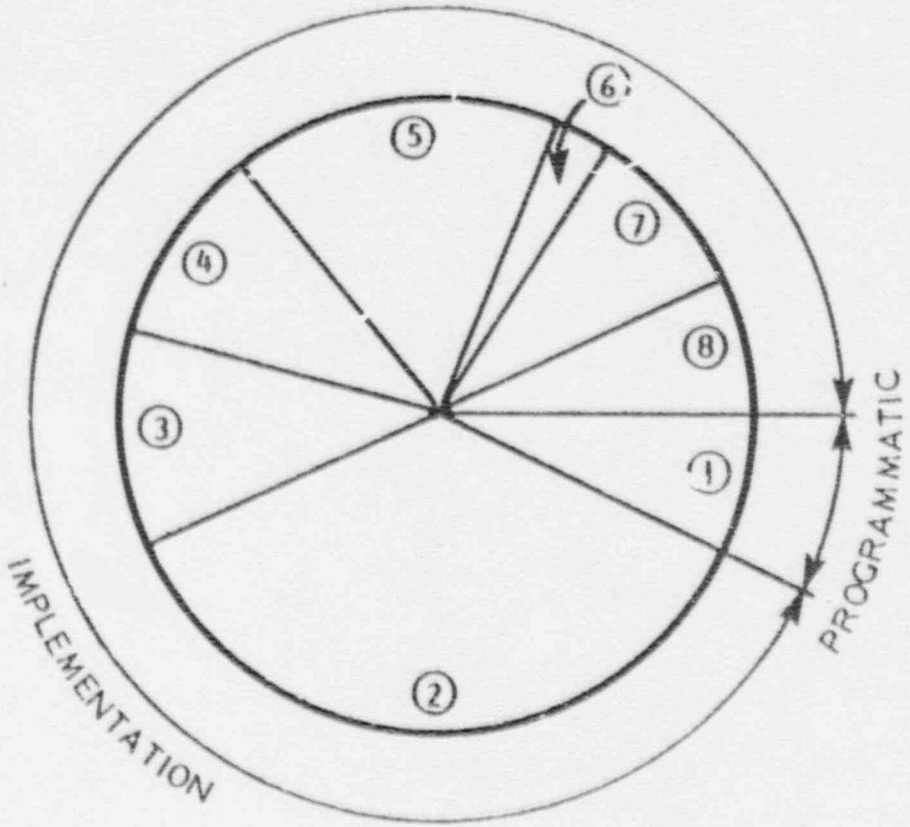
RHR/Safety Injection System - Train B

- 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.

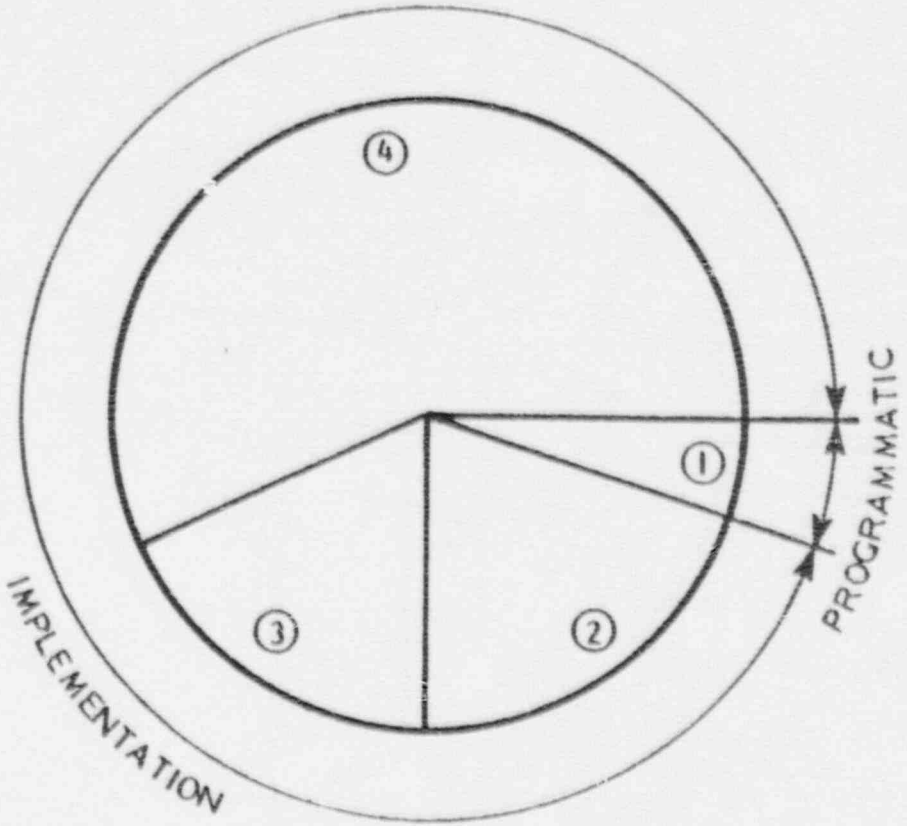
- Assess the adequacy of the piping and pipe support design.
- Assess the adequacy of the organization (Criterion I) and corrective action programs (Criterion XVI) as they pertain to design.
- Verify the adequacy of the implementation of Criteria I and XVI.

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

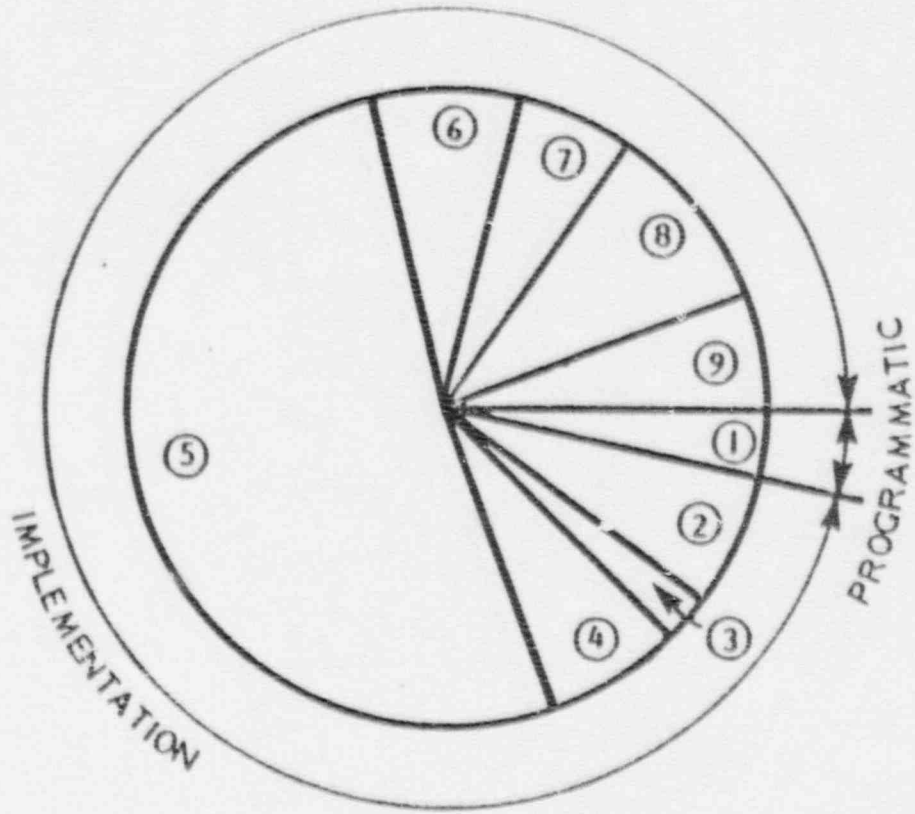
- Design control
  - Design input control
  - Design verification control

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

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

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

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 Engineer, 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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