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UNITED STATES
NUCLEAR REGULATORY COMMISSION

C O N F I D E N T I A L

IN THE MATTER OF:

INVESTIGATIVE INTERVIEW

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UNITED STATES OF AMERICA

BEFORE THE

NUCLEAR REGULATORY COMMISSION

COMANCHE PEAK TECHNICAL REVIEW TEAM

CLOSEOUT INTERVIEW

TELEPHONE CONFERENCE

Ace Federal Reporters, Inc.
Suite 402
444 North Capitol Street, N.W.
Washington, D. C. 20001

Wednesday, October 31, 1984
7:05 p.m.

ATTENDING:

[redacted] Interviewee

NRC Staff:

R. C. TANG
DAVID JENG
BOB PHILLEO

DAVbw

MS. TANG: For the record --

[redacted] who's supposed to talk now.

MS. TANG: I'll do an introductory, then call on the technical reviewer.

For the record, this is a telephone interview of [redacted] for the purpose of providing feedback regarding technical review team assessment of certain concerns raised by [redacted] about the construction of the Comanche Peak facility. Present at this interview are myself, R. C. Tang, with the NRC's Comanche Peak Technical Review Team, our technical reviewers, David Jeng and Bob Philleo.

As agreed, this interview is being transcribed.

[redacted] before we ask you the technical questions, we need you to tell us some details about your employment -- I guess, former employment at Comanche Peak. Tell us a little bit about your qualifications too, all right? Go on.

[redacted] Employment at Comanche Peak?

MS. TANG: Tell us during what time frame you worked there and what you did, the position and what kind of responsibilities you had on the job and what kind of qualifications were required for you to hold that job. That kind of thing.

DAVbw

[redacted] I've forgotten the date. [redacted]

MS. TANG: Roughly, what year.

[redacted] I believe it was '75.

MS. TANG: 1976 until when?

[redacted] '78.

MS. TANG: Okay.

[redacted] I was fully qualified of all jobs. Worked on two other previously. I was highly qualified for that crew.

MS. TANG: Okay. Do you hold any certificates or degrees, that kind of thing?

[redacted] No.

MS. TANG: Since this is the first interview by the TRT, our Technical Review Team was formed in June of this year and it consists of roughly 50 technical reviewers, you know, that is, the specialists in the field. The purpose of this team is to evaluate and resolve a number of technical issues and allegations identified. And the team has several different small groups, and civil structural engineering is one of the groups, which is what we're going to focus on tonight.

I am going to turn over to our technical reviewers, David Jeng and Bob Philleo. They will tell you first about our understanding of your earlier concerns.

Now when they discuss with you, if you think there is a mistake or anything, make corrections as they go along. Then they will tell you our preliminary findings. These are things that have not been made public.

We wanted to check with you for two purposes, to make sure that 1) we understood your concerns correctly and our evaluations are in the right direction, and secondly, is to find out whether you have additional comments along that line. That sort of thing. All right? Okay.

Dave and Bob.

MR. JENG: This is David Jeng. I am an NRC employee who is involved in the civil structural group for the Comanche Peak concerns. With me is Mr. Philleo. He is a well-known expert in concrete technology, construction design and all related testing. Mr. Philleo, for [redacted] information, has served as president of the ACI Committee and the chairmanship, and Mr. Philleo has been involved in many, many heavy constructions, including nuclear power plants design, review, resolution of difficult issues.

Mr. Philleo is serving as our consultant, and in that capacity, he did most of the review of the concerns raised by [redacted]

At this time, I'd like to have Mr. Philleo go into detail of our understanding of your concerns and how we performed our evaluations and step by step inform you for

your information what we have found and what is the basis of our findings.

I now turn it over to Mr. Phillips. Bob?

MR. PHILLIPS: All right. This is Bob Phillips.

As you've heard, I am serving as a consultant on the civil structural problems. I was formerly chief of the Structures Branch at the Washington headquarters with the Corps of Engineers.

You expressed concern about what was given to us as bad concrete and sloppy concrete. We didn't have anything much more definite than those two terms, so we didn't have a specific place to look; however, we had to investigate a large part of the concrete in connection with other people's charges, so we developed quite a bit of background in the concrete operation.

In dealing with your concerns, we went into several safety-related structures there, and we did look at 23 parts of the structure, selected at random. In addition, we looked at 15 nonconformance reports that had been generated on the job, having to do with concrete. In the ones that we inspected at random, there were 14 out in the auxiliary building, three out of the Unit 1 safeguards building, three out of the No. 1 containment structure and three out of Unit 2 containment.

In those we could find nothing documented in the

record that indicated sloppy concrete that actually got into the project. Of course, things can get in without making it into the record. So one thing we looked at in particular was the final strengthening bolts which are the primary basis of acceptance. In all those cases, the strength results were satisfactory. All the work we did, we found no failing strength cylinders in safety-related structures.

The NCRs, the nonconformance reports, did indicate some defective placements of concrete, and in those 15 that we examined, there were 7 that did require repair. We conformed that the repair was done. We performed a walk-through inspection of all those locations where it was still possible to obtain access and found, from what we could see, everything was in good shape and nothing had deteriorated since placement.

Probably the thing that gave us the greatest confident was, at least in the Unit 1 containment structure, that structure has been subjected to a structural integrity test, where the whole interior is subjected to 115 percent of the pressure that would be experienced in an accident, require not only to withstand that pressure but to act according to a particular deformation criteria, and it did pass that test, but that's sort of an overall test of that whole structure, whatever might have gone wrong here, and there the whole structure did pass that pressure test.

so we were unable to find any placement [illegible] safety-related structures there, where either had concrete did get placed and ultimately not required. And we did find that the most critical of the structures probably did pass structural integrity tests.

That's about the substance of our dealing with your particular concern, and our findings.

MR. JENG: This is David Jeng.

[redacted] in addition to the information Mr. Philleo just mentioned, I'd like also to inform you, for your understanding, that we did interview four quality control inspectors who were involved in the concrete placement, and these inspectors indicated to us a piece of additional information, that before each placement, the people who were involved, engineers, inspectors, would get together and discuss everything which had to be done had been, and go over the record according to the procedures. And they informed our reviewer whatever procedures needed to be taken and to look after what were properly followed.

This piece of information also may not be substantial, but it was some additional basis for us to come to the conclusion that Mr. Philleo just mentioned to you.

At this time, I would suggest, if possible, that [redacted] if you have any question or positions or additional points, would you please take the opportunity to

DAVIS

let us know.

[redacted] you referred to the concrete tests. They're very easy to falsify. I have been in areas where your concrete cylinder will not be turned in, and you can create what test you want it to come out at. I have done it myself. Therefore, your concrete cylinder test is not really a true test, but when you have trucks sitting there for hours waiting to unload, no method of cooling the concrete down, you're getting bad concrete.

MR. JENG: [redacted] I'm trying to understand your concern.

MR. PHILLEO: Bob Philleo again.

You mentioned the possibility -- as I interpret it, you mentioned two possibilities. One is, there might actually be some error in the reported results of the cylinders. And second, that the cylinders might not represent the true case, although, as far as the first one goes, whether there was actually any fraud in the cylinders themselves, that is being looked into. And for the period of your employment, there were some people who expressed some doubt as to the accuracy of the cylinders.

So there is a test being required to test the concrete in place, to see if during that period there was anything wrong with the cylinders.

The second point about the deterioration of

DAVmw

concrete while the trucks are [illegible], waiting to [illegible] there in the heat, you are correct, that that would cause some problem with the concrete, but that sort of problem is picked up in the cylinders, because the cylinders aren't made until the truck is in the process of discharging. So if there is any substantial loss of strength or other properties during that process, that should show up in the cylinders.

[redacted] I'll interrupt you on that fact, because your cylinders are made out of one truck. I've never seen one taken out of a trunk. A truck is picked. A cylinder is taken. That was the test. I've seen it done. Out of one special truck. No cylinders out of other trucks.

MR. PHILLEO: That's correct. You don't sample every truck, but there's a required sampling rate. We did check that, that they always took the number of cylinders that were required. And it is certainly correct that every truck didn't get sampled, but that their sampling is on a random pattern. And the problems that might exist do get picked up.

MR. JENG: [redacted] any more questions or comments?

[redacted] No. I haven't got any more specific.

MR. TANG: When Mr. Philleo explained [illegible] understanding of your original concerns, did we understand

you correctly?

[redacted] You'll have to speak that.

MS. TANG: When Mr. Phillips started, he tried to describe our understanding of your concerns.

Were we correct in that understanding?

[redacted] Yes.

MS. TANG: Now, do you think -- well, obviously you have had questions and discussion with us.

Do you think we have adequately covered your concerns?

[redacted] I believe so.

MS. TANG: For the time being, do you have any additional concerns that could be related to the earlier concerns that could be isolated?

[redacted] No. I can't think of any right off hand.

MS. TANG: David or Bob, do you have anything else?

MR. JENG: No, I have not. Bob, anything?

MR. PHILLEO: Bob Philleo. I have nothing else to say at the moment.

MS. TANG: [redacted] later on I will give you a number to contact us, if later on you think of anything or if you have additional questions. But around January of 1985, our final result will be published in a report which

if you request, we will make it available to you. But if appropriate, we will require a corrective action by the utility, depending on what we find. One of the areas that might be possible.

Have you given your statements to us today freely and voluntarily?

[redacted] Yes.

MS. TANG: All right.

If you don't have any more questions, David or Bob, maybe we'll just turn off the recorder.

MR. JENG: I have no more questions.

MS. TANG: Bob Philleo? Okay.

Dave, we can turn off the machine now.

(Whereupon at 7:20 p.m. the telephone conference was concluded.)

CERTIFICATE OF OFFICIAL R

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

NAME OF PROCEEDING: INVESTIGATIVE INTERVIEW

DOCKET NO.:

PLACE: WASHINGTON, D. C.

DATE: WEDNESDAY, OCTOBER 31, 1984

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

(Sigt) David L. Hoffman by
(TYPED)

Official Reporter

Reporter's Affiliation

SSER

1. Allegation Category: Civil and Structural No. 21, Schmidt Hammer Testing

2. Allegation Number: AC-65, AC-66

3. Characterization: Questions have been raised as to:

   a. why some concrete that was committed to be retested was not (AC-65);

   b. the validity of tests performed during construction (AC-66); and

   c. the validity of tests to be performed in the resolution of an open issue, particularly in regards to:

      (1) under whose direction the tests are to be conducted,

      (2) credentials and ability of the individuals performing the tests, and

      (3) the involvement and oversight of the NRC (AC-66).

   These questions surfaced during an interview with the alleger.

4. Assessment of Safety Signficance:

   a. The documentation provided by the alleger indicates that no Schmidt hammer test data for concrete pours no. 201-5781-001 in the Reactor #2 Cavity Wall and 002-5778-001 in the Auxiliary Building east wall appear to exist. In both cases Schmidt hammer tests were scheduled to be performed because field-cured cylinders were mishandled and were not representative of the in-place concrete. In both cases

the laboratory-cured cylinders met strength specifications and curing records demonstrate that adequate curing temperatures were maintained throughout the required curing period. These facts are not disputed by the alleger. These data are sufficient to establish that adequate concrete exists in walls in accordance with the provisions of "Cold Weather Concreting," American Concrete Institute 306 R-78 (ACI 306 R-78).

b. The alleger noted that Schmidt hammer tests were made at various times by both Hunt and TUEC personnel and she questioned the competency of the testers. The TRT is aware of no documentation which certifies the ability of the testers to perform this particular test. However, most of the testing was done to verify the condition of concrete placed in cold weather when either the curing records indicated a failure to maintain required curing temperatures during the latter stages of the curing period or the field-cured cylinders failed to attain the required strength. But in all cases laboratory-cured cylinders had adequate strength and the concrete was adequately protected from freezing for the first few days so that it satisfied the requirements of ACI 306 R78 for concrete not loaded at a young age. The only set of Schmidt hammer data which played a necessary role in establishing the acceptability of the concrete was in pour 105-7801-001, a suspended slab in the Unit 1 Safeguards Building. This section may, ~~if desired,~~ be retested.

c. The alleger expressed reluctance to accept the Schmidt hammer test as a means of establishing the acceptability of concrete in dealing with an open issue until acceptable answers were given to her questions. The answers were as follows:

(1) The TERA Corporation has been retained as a third party to direct the testing. TERA has retained Jack Benjamin and Associates as statistical consultants to assist with the experimental design and analysis of data.

(2) The actual testing is being done by Southwest Research Institute. That institute has a certification procedure, and the certification of the testers is documented.

(3) NRC worked closely with TERA in developing the test program, and members of the TRT observed the testing for two days during the early part of the execution of the program.

5. Conclusions and Staff Positions: There are no structural safety issues related to ~~these allegations for the following reasons:~~ a and c below. Action is required on b.

a. In spite of the fact that Schmidt hammer tests scheduled to be performed on certain structural elements apparently were not performed, available data indicate the concrete is satisfactory. The failure to perform scheduled tests is a QA/QC issue which will be assessed as a part of the overall programmatic review concerning procedures addressed under QA/QC Category 6, "QC Inspections."

b. While no documentation has been found certifying the competency of those individuals who performed the Schmidt hammer test during construction, the testing played an indispensable role in establishing the adequacy of only one structural element. That element is performing satisfactorily, ~~and may~~ but it should be retested ~~if deemed~~ to remove any doubts as to structural integrity

c. Adequate measures have been taken to ensure reliable results of tests being performed to resolve an open issue.

The TRT interviewed the alleger at the time these questions were raised. There will be further contact to discuss the disposition of the questions.

6. Actions Required: None.

[redacted]

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5 [illegible]: The slab supported by seismic [illegible] 105-[illegible]-[illegible]01 in the Unit No. 1 [illegible] Building should be tested by the Schmidt hammer. The tests should be carried out by a qualified operator.

[redacted] 5

8. Attachments: None.

9. Reference Documents:

1. Concrete placement package 201-5781-001.
2. Concrete placement package 002-5778-001.
3. Concrete placement package 105-7801-001.
4. Cold Weather Concreting, American Concrete Institute 306 R78.

10. This statement prepared by:

R. Philleo, TRT
Technical Reviewer

Date

Reviewed by:

Larry Shao,
Group Leader

Date

Approved by:

Vincent Noonan,
Project Director

Date

SSER

No. 21

1. Allegation Category: Civil and Structural ~~No. 18~~ No. 21, Schmidt Hammer Testing

2. Allegation Numbers: AC-65, AC-66

3. Characterization: Questions have been raised as to:

a. why some concrete that was committed to be tested was not (AC-65)

b. the validity of tests performed during construction (AC-66)

c. the validity of tests to be performed in the resolution of an open issue, particularly in regard to:

(1) under whose direction the tests are to be conducted,

(2) credentials and ability of the individuals performing the tests, and

(3) the involvement and oversight of the NRC. (AC-66)

These questions surfaced during an interview with the alleger.

4. Assessment of Safety Significance:

a. The documentation provided for the alleger indicates that no Schmidt hammer test data for concrete pours No. 201-5701-001 in the Reactor #2 Cavity Wall and 302-5778-001 in the Auxiliary Building east wall ~~were never tested by the ...~~ appear to exist. In both cases Schmidt hammer tests were scheduled to be performed because field-cured cylinders were mishandled and

were not representative of the in place concrete. In both cases the laboratory-cured cylinders met strength specifications and curing records demonstrate that adequate curing temperatures were maintained throughout the required curing period. These facts are not disputed by the alleger. These data are sufficient to establish that adequate concrete cover in walls in accordance with the provisions of "Cold Weather Concreting," American Concrete Institute 306 R-78 (ACI 306 R-78).

b. The alleger noted that Schmidt hammer tests were made at various times by both TUGC and TVA personnel, and she questioned the competence of the testers. The TVA is aware of no documentation which certifies the ability of the testers to perform this particular test. However, most of the testing was done to verify the condition of concrete placed in cold weather when either the curing records indicated a failure to maintain required curing temperatures during the latter stages of the curing period or the field-cured cylinders failed to attain the required strength. But in all cases the concrete was adequately protected from freezing for the first few days so that it satisfied the requirements of ACI 306 R-78 for concrete not loaded at a young age. The only set of Schmidt hammer data which played a necessary role in establishing the acceptability of the concrete was in pour 105-7801-001, a suspended slab in the Unit 1 Safeguards Building. This information may, if desired, be related.

c. The allegation that procedures to accept the Schmidt hammer test as a means of establishing the probability of concrete in dealing with objection issues unless acceptable answers were given to ten questions. The answers are as follows:

(1) The TERA Corporation has been retained as a third party to direct the testing. TERA has retained Jack Benjamin and Associates as statistical consultants to assist with the experimental design and analysis of data.

(2). The actual testing is being done by Southwest Research Institute. That institute has a certification procedure, and the certification of the testers is documented.

(3). NRC worked closely with TERA in developing the test program, and members of the TRT observed the testing for two days during the early part of the execution of the program.

5. Conclusion and Staff Positions: There are no structural safety issues related to these allegations for the following reasons:

a. In spite of the fact that Schmidt hammer tests ~~were~~ scheduled to be performed on certain structural elements apparently were not performed, available data indicate the concrete is satisfactory. The failure to perform scheduled tests is a QA/QC issue which will be assessed as a part of the overall programmatic review concerning procedures addressed under QA/QC Category 6, "QC Inspections"

b while no documentation has been found certifying the competence of those individuals who performed the Shmidt Hammer test during construction, the testing played an indispensable role in establishing the adequacy of only one structural element. That element is performing satisfactorily and may be retested if desired.

c. Adequate measures have been taken to insure reliable results of tests being performed to resolve an open issue.

The TRT interviewed the alleger at the time these questions were raised. There will be further contact to discuss the disposition of the questions.

6 Others Required: None

[redacted]

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8. Attachments: None

9. Reference Documents:

1. Concrete placement package 201-5781-001
2. Concrete placement package 002-5778-001
3. Concrete placement package 105-7801-001
4. Cold Weather Concreting, American Concrete Institute # 306R-78.

10 This statement prepared by: Robert E Phillips — Date

Received by

Approved by: Jack Shao — Date
Vice President — Date

[FOIA-85-69
C/258]

-SSER

1. Allegation Category: Civil and Structural No. 20, Cracking of Concrete

2. Allegation Number: AC-57, AC-63, AC-64

3. Characterization: Questions have been raised as to:

a. whether there is a potential tie-in between NCR C-669 and NCR C-1314 with the basemat crack in Unit 1 (AC-57);

b. General cracking of concrete (AC-63); and

c. The extent of the crack in the basemat (AC-64).

These questions surfaced during an interview with the alleger.

4. Assessment of Safety Significance:

a. The crack, which occurred near the bottom of the reactor vessel and not in the base mat, is treated in detail in the discussion of allegation AC-44 in the SSER for Civil/Structural Category 13. There it is demonstrated that the crack occurred each as a consequence of the shape of the form and the fact that the entire section of concrete was placed in a single monolith. The crack was independent of the difficulties

cited in FCR C-82-1 and C-82-4 and, in fact, occurred before these other events occurred. NCR C-[illegible] is discussed in the SSER for Civil/Structural Item 6 as a reportable deficiency reported by Report IV. And NCR-131-C is discussed in the SSER for Civil/Structural Category 18 in the treatment of allegation AC-56. While these deficiencies are not related to the reactor vessel cavity, they have not been ignored by the TRT.

b The allegation expressed concern about general cracking of the concrete and the apparent lack of comprehensive investigation of the subject.

Q Much of the confusion on this point results from different definitions of shrinkage cracks which have appeared in various parts of the record. Concrete begins its life in a saturated condition. As it dries to come into equilibrium with the ambient humidity, it decreases in volume. If it is restrained from achieving any or all of this volume decrease, tensile stress is developed. If the tensile stress is high enough, the concrete cracks. In general there are two types of restraint, internal and external. Their effect on cracking can be quite different. Internal restraint develops in any mass of concrete exposed to drying on its external surfaces.

The surface layers dry out faster than the interior mass and are, therefore, restrained by the interior. The thicker the section, the greater the resulting tension at the surface and the more likely the occurrence of cracking. All but the very thinnest floor slabs and walls must crack. The problem is managed in two ways. Where appearance is of paramount importance, closely spaced grooves are placed in the concrete surface during construction. These produce weakened planes which predetermine the location of the cracks. When the concrete cracks, the cracks are hidden in the grooves. Otherwise cracks are controlled by the arrangement of reinforcing steel. While the total cumulative width of cracks in a 20-foot span is a constant determinable amount, the judicious selection of size and spacing of reinforcing bars can cause their crack thickness to be distributed among many cracks rather than a single crack. Several hairline cracks are preferable to a single wide crack.

A When the restraint is produced by ~~geonetic~~ GEOMETRIC configuration external to the concrete, the tensile forces tend to be concentrated in a limited area and are not subject to redistribution by placement of reinforcing steel. The ~~bacemat~~ reactor vessel in Unit 1 is a classic example. The shape resembled a doughnut with a rigid interior form. When the concrete attempted to reduce in volume, the attempt was resisted by the rigid internal form. In a round symmetrical doughnut the location of the crack would be random, but in the non-symmetrical doughnut of the ~~bacement~~ vessel it could be predicted that the crack would occur at the midpoint of the thinner sides.

Both the ~~basement~~ reactor vessel crack and floor cracks at Comanche Peak may be characterized as shrinkage cracks, but they are quite different in width and extent. It may be noted that in thick masses of concrete there are contraction cracks similar to shrinkage cracks which result from cooling of the concrete to ambient temperature after the concrete has been heated by hydration of the cement. They can be controlled in the same manner as shrinkage cracks. The TRT observed no cracks in the structures which it interpreted as having structural significance.

C. The allegor expressed concern about the reactor vessel crack in Unit No. 1, particularly in the facts that the extent of the crack has not been well-defined and that the pertinent Non-Conformance Report (NCR) has undergone several revisions. The allegor provided additional documentation on the crack.

II The information was principally in three forms:

(a) A complete chronicle of NCR-C650 and its several revisions.

(b) A presentation of available descriptions of the crack which do not agree on whether it extends clear across the 7-foot thickness of the ~~base mat~~ concrete lift.

(c) Documentation that field-cured cylinders ~~from the basemat~~ failed to attain specified strength in 28 days.

These are discussed below:

(a) The revisions to the NCR all dealt with changes in the proposed method for repairing the crack with epoxy-resin. There are no changes in the description or analysis of the crack.

(b) The descriptions of the crack are not in conflict; they contain different degrees of detail. It is prudent to assume the worst case condition in which the crack extends completely through the lift ~~basemat~~, dividing it into two sections. This is the configuration in which it was originally designed with a construction joint through the middle. As discussed in the SSER for Civil/Structural Category 13, where allegation AC 44 is evaluated, this separation has no impact on safety. The critical load is that resulting from a postulated accident in which all the load is carried by the steel.

(3) The field-cured cylinders are among those discussed in the SSER for Civil/Mechanical Category 3 in the evaluation of Allegation AC-52. For this type of structure the field-cured strengths were adequate.

There was further speculation as to whether this crack was properly regarded as a shrinkage crack and whether there was opportunity for corrosion of reinforcing bars during the long period before the crack was repaired. The confusion on definition resulted from quoting out of context a discussion of shrinkage cracks on the surface of floor slabs. Corrosion is unlikely. While at various times during construction there might have been some water on top of the mat, the structural configuration of the mat was such that the crack would be tightly closed at the top. There was no other access for water.

5. Conclusions and Staff Positions: There are no structural safety issues related to these allegations for the following reasons:

a. The crack near the bottom of the reactor vessel cannot be related to deficiencies in placing or bending reinforcing bars in other parts of the vessel because it occurred before the deficiencies occurred.

b. Shrinkage and contraction cracks observed in many parts of the structure are normal and have no structural significance.

c. The work in the reactor vessel does not violate the conditions assumed in design.

The TRT interviewed the alleger at the time these questions were raised. There will be further contact to discuss the disposition of the questions.

6. Action Required: None

[redacted]

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8. Attachments: None.

9. Reference Documents:

Non-Conformance Reports
a. C-650
b. C-669
c. C-1311

10. This statement prepared by: _____ Date
R. Pfeiffer, TKT
Technical Reviewer

Reviewed by: _____ Date
Larry Shao,
Group Leader

Approved by: _____ Date
Vincent Noonan,
Project Director

SSER

1. Allegation Grade: Civil and Structural, No. 19, Concrete Voids

2. Allegation Number: AC-61, AC-62

3. Characterization: The alleger cited many NCR's which dealt with deficiencies in concrete placing or in exposure following placement.

a. A letter from Mrs. Juanita Ellis, President of CASE to Mr. Vincent Noonan, NRC, dated December 6, 1984 referred to honeycombed concrete in the Unit 1 Auxiliary Building, which has already been dealt with as AC-32 in the SSER for Civil/Structural Category 4, and to the material provided by CASE to the TRT at a meeting on November 7, 1984, discussed below in Allegation AC-62. (AC-61)

b. The more ten NCR's which dealt with honeycombed concrete, one with a curing deficiency, one with depressed concrete to fix ~~an~~ and one with premature stripping of a structural slab, and one with floor cracking (AC-62).

4. Assessment of Safety Significance:

a. Allegation AC-61 is treated completely in the discussion of Allegations AC-32 and AC-62.

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CASE Exhibits 490, 492, 502, 503, 506, 507, 533, 535, 536, 537, 538, 539, 540, 541, and 542 were essentially reprints of the following NCRs: C1112, C1170, C1389, C1367, C1303, C1294, C723, C1338, C1176 (R1 and R 2), and C1784 (R 1, R2 and R3). These documents cite 86 areas of honeycomb sufficiently deep to expose reinforcing bars. While these occurrences indicate that workmanship at the placing site was not commensurate with the quality of the concrete delivered to the site and that the contractor could have saved money by improving placing techniques and avoiding repairs, they have no effect on safety on a project of their size. ~~The typical volume~~

These problems occurred at the rate of only about one per month during the life of the project. Observations in the plant indicate that all honeycomb areas have been detected and reported. The typical volume of each repair

was about a tenth of a cubic yard. Thus, less than 10 cubic yards, or about 0.01% of the total concrete was replaced. There is every evidence that QA-QC did a good job in monitoring repair activities. The NCRs contain a great deal of information on repair. In some cases rather sophisticated techniques were used, incorporating vents for expelling air from the form as repair concrete was placed. There was only a single allegation of improper repair. That allegation, repeated in CASE Exhibit 253, was discussed in the SSER for Civil/Structural Category 4 in the evaluation of Allegation AC-32.

Case Exhibit 487 cited NCR C838, which described a violation of curing requirements during cold weather. The problem was dealt with satisfactorily by the application of curing compound.

Case Exhibit 500 cited NCR C1335, which dealt with a fire on the dome of Unit #1. The damaged area was successfully repaired.

Effectiveness of the repair has been confirmed by the structural integrity test as documented in "Final Test Report on Structural Integrity Test for Unit 1 Concrete Containment Structure, CPDA-31, 792."

CASE Exhibit 528 cited NCR C511 (R1) which dealt with the loading of a slab 16 hours after it was placed. Since this incident occurred while shores were still in place, there was no damage to the concrete.

4. see the discussion of allegation AC-32 in the SSER for Civil-Structural Category 4 and the discussion of allegation AC-62 below.

b. The honeycombed areas were all detected, and the repairs were well executed and well documented.

The slight curling deficiency, while true, was adequately dealt with by application of a curing compound.

The area on the dome of Unit No 1, which was exposed to fire successfully passed the structural integrity test.

The slab which was loaded to only was still supported by shores at the time of the loading.

see the discussion of allegation AC-33 in Civil-Structural Category 4 for treatment of floor cracking.

Case Exhibit 253 also repeated Allegation AC-33, which was evaluated in the SSER for Civil/Structural Category 4. This allegation dealt with cracking of floors.

5. Conclusion and Staff Positions: There are no structural safety issues related to these allegations for the following reasons:

The TRT understood the above NCRs were turned over to the TRT. There will be further contact to discuss their disposition.

6. Calculations: None

[redacted]

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8. Attachments: None

9. References Documents:

a. CASE Exhibits 253, 487, 490, 492, 500, 502, 503, 506, 507, 528, 533, 535, 536, 537, 538, 539, 540, 541, and 542.

b. Non-Conformance Reports C571(R1), C723, C838, C1112, C1170, C1176 (R1 and R2), C1291, C1303, C1335, C1338, C1367, C1389, and C1784 (R1, R2, and R3).

c. Final Test Report on Structural Integrity Test for Unit 1 Concrete Containment Structure, CPDA-31, 797.

10. This statement prepared by: _____ Date

R Chilko, TRT
Technical Services

Reviewed by: _____ Date

L. Shao,
Group Leader

Approved by: _____ Date

Vincent Noonan,
Project Director

f. Inadequate Strength of Field-Cured Cylinders

The TRT investigated several instances of field-cured cylinders in cold weather which failed the requirement of achieving 85% of the strength of standard laboratory-cured cylinders at 28 days. For all structural elements except one, the concrete was of a configuration that it was acceptable under the provision of "cold weather concreting," American Concrete Institute 306 R-78, by virtue of the fact that the laboratory strength was adequate and the concrete was protected from freezing for two days following placing. The exception ~~is~~ pertains to the slab in the Unit 1 safeguards building identified as placement 105-7801-001. Adequate strength of this slab has not been documented.

Accordingly, TUEC shall:

1. Test the slab with the Schmidt hammer, making use of certified operators. A test plan should be submitted for TRT review and approval prior to test.
2. Compare the test results with those obtained in the test program generated for the investigation of the alleged falsification of compression strength test results to determine whether the slab has adequate strength.

6. Allegation of Improper Field-Cured Specimens

The TRT investigation found several instances of field-cured concrete cylinders in cold weather which failed the requirement of achieving 85% of the strength of standard laboratory-cured cylinders at 28 days. For all structural elements except one, the concrete was of a composition that it was acceptable under the provisions of "Cold Weather Concreting," American Concrete Institute 306-78, if the laboratory strength was adequate and the concrete was protected from freezing for three days following placing. The exception is the slab in the Unit 1 Safeguards Building identified as placement 105-7801-001. Adequate strength of this slab has not been documented.

Accordingly, TUEC shall:

1. Test the slab with the Schmidt hammer, making use of certified operators.
2. Compare the test results with those obtained in the test program generated for the investigation of the alleged falsification of compressive strength test results to determine whether the slab has adequate strength.

SSER

1. Allegation Category: Civil and Structural 1g, Reinforcing Steel

2. Allegation Number: AC-53, AC-55, AC-56, AC-58, AC-59 and AC-60

3. Characterization: Concerns have been raised concerning the disposition of the following nonconformance reports (NCR's)

a. NCR C-82-00523, Reinforcing steel missing from the Unit 1 containment wall (AC-53).

b. NCR C-811, 46 - No. 9 reinforcing bars were omitted from a wall in the excess letdown heat exchanger room in the Unit 1 Containment (AC-54).

c. NCR C-1314, 57 - No. 5 dowels were bent and 10 - No 5 dowels were broken off at the concrete in the Unit 1 Containment (AC-55).

In addition there have been concerns raised concerning the fact that

d. no analyses were performed justifying the omission of rebar (AC-58).

e. the omission of reinforcing steel is another example of QA/QC failure (AC-59).

And finally

f. a concern has been raised questioning the conclusion drawn by a Region IV investigation of an allegation concerning the omission of horizontal "tie" reinforcement in Unit 1.

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C/260

4. Assessment of Safety Significance

a. On May 3, 1982 nonconformance report (NCR) C-82-00523 was issued that documented the omission of No. 6 "Z" shaped shear ties from a concrete placement within the construction access opening in the Unit 1 Containment wall. The concrete of placement No. 101-5805-036 had been placed to elevation 823'-6 without the shear bars having been placed at the 820 foot, 8 inch and 822 foot - 6 inch elevations. Gibbs & Hill (G&H) was informed of this omission on May 4, 1982 by Brown & Root (B&R) engineering. G&H engineering evaluated the situation and concluded that the as-constructed condition was acceptable provided that one additional row of No. 6 shear ties was placed at elevation 823 foot - 6½ inch to compensate for the missing two rows. B&R engineering then issued Design Change Authorization (DCA) No 13,533 on May 17, 1982 to add the additional row of No. 6 shear ties. On May 18, 1982 as per the disposition of NCR C-82-00523 the placement of the additional reinforcing steel was inspected and accepted.

b. The concern about the omission of 46 - No. 9 reinforcing dowels in a wall between the excess letdown heat exchanger room and steam generator compartment No. 1 in Reactor Building No. 1 was previously addressed in Civil/Structural Category 6. The disposition of NCR C-811 dated October 31, 1977 directes that the 46 missing reinforcing dowels be placed by drilling holes which were to be 2½ inches in diameter and 48½ inches deep, placing the rebar and finally filling the remaining hole with grout. The TRT based its assessment on the basis that all 46 reinforcing dowels were drilled and grouted in place. Subsequently the TRT obtained Design Change/Design Deviation Authorization (DC/DDA)

No 6916 which states that due to rebar Congestion and embedments it was not possible to drill all of the required 46 holes or to obtain the specified embedded depth of 48½ inches on some of the drilled holes. B&R construction was able to drill 35 holes of which only 3 had a depth greater than 48½ inches. Because the specified hole depth could not be met B.W. Hunt Co, which operated the concrete testing laboratory on site, performed pull out tests on samples of grouted rebar to determine the embedment (hole depth) that would provide sufficient anchorage to develope the strength of a No. 9 reinforcing bar using a specified type of grout. These tests showed that an embedment of 18 inches would be sufficient. Of the 35 holes drilled 5 had a depth of less than 18", these holes were not used and were filled with grout. In summary 30 of the missing 46 reinforcing dowels were placed. The DC/DDA further stated that calculations were made confirming the adequacy of the reduced quantity of reinforcing steel to patorm the required design function. The calculations were contained in calculation book No. SRB-120C. The TRT learned that TUEC had requested these calculations from Gibbs & Hill on December 26, 1984 as part of their effort to research all cases of reinforcing steel omissions for proper engineering disposition. This action stemmed from the request for more information by the TRT pertaining to the missing rebar issue identified in Civil/Structural Category 6. TUEC was informed by G&H that the relevant calculations in book SRB 120C could not be traced and that new calculations were being prepared. The TRT reviewed these new calculations and determined that based on these calculations the wall will adequately carry the design loads.

c. On January 17, 1979 NCR C-1314 was issued reporting that 57-No. 5 dowels had been bent and another 10-No 5 dowels were broken off at the concrete in Reactor Building No 1 due to the installation and removal of shoring and scaffolding in the area. These dowels were located at the 808 foot elevation between columns 9 and 10, and were intended to serve as reinforcement for the foundations of the nuetron well cooling units. These dowels protruded from the 808 foot elevation slab approximately two feet and were intended to be bent later to meet foundation requirements. On July 2, 1979 DC/DDA No 5030 was issued which detailed these foundation requirements and noted that the existing No 5 dowels be bent as required. Following the issuance of the DC/DDA, NCR C-1314 was updated instructing B&R Construction to heat and bend any existing (57) No 5 dowel in accordance with B&R procedure CCP-18 to meet the foundation requirements and to replace any cracked or broken No 5 dowel by drilling and grouting per B&R procedure CCP-12. The TRT reviewed the inspection reports documenting the heating and bending of the bars and the drilling and grouting of the dowels that were broken off. These inspection reports indicate that the work was performed according to procedure in a satisfactory manner.

diande. In Civil/Structural No 6 the TRT
Cases concerning the omission of reinforci[illegible] concrete placements. A concern has been raised [illegible] many cases calculations were not performed justifying the [illegible] all but one case previously reviewed by the TRT, the omission of reinforcing steel in the Unit 1 reactor cavity, the TRT has found that the situation was resolved in an acceptable manner. In some cases the reinforcing steel was added

by drilling and grouting or calculations were performed showing the structure able to carry the design loads as built. As mentioned before TUEC is in the process of researching all documented case of missing reinforcing steel for proper engineering disposition. The TRT will review the results of this effort to determine if further action is required on the part of TUEC to verify the adequacy of the affected structures in the as-built condition.

Also in Civil/Structural Category 6 the Civil/Structural ~~the Civil/Structural~~ group determines that there was an apparent breakdown in the quality control program as evidenced by the fact that omitted reinforcing steel was not detected prior to concrete placement. The Civil/Structural group refers this matter to the TRT QA/QC group for further programmatic consideration.

f. A concern has been raised questioning the conclusion drawn by a Region IV inspection (Inspection Report 79-25) which investigated the allegations made in 1979 concerning the omission of horizontal "tie" reinforcement in the Unit 1 Containment. Region IV concluded that the alleger was referring to a documented case in Unit 2. This conclusion was based on the fact that this omission occurred shortly before the alleger terminated his employment and that the allegation was made based on hearsay information relative to events about which the alleger had little or no personnel knowledge. The TRT investigated this allegation in Civil/Structural Category 6 and came to the same conclusion as did Region IV. The TRT based its conclusion on the fact that the rebar placement checklists for the Unit 1 Containment wall showed all reinforcing placed as required. Subsequently the TRT has searched a computer listing of all design deficiency reports (DDR) and NCR's written in the Civil/Structural area up to November 7 1984. The TRT found two NCRs documenting missing reinforcing steel in the Unit 1 and 2

containment walls (NCR C-1653 and NCR C-82-00523). NCR C-82-00523 was previously addressed in item a. and occurred in 1982 long after the placement of the Units 1 and 2 containment walls and after the allegation was made. NCR C-1653 documented the case of the missing horizontal shear ties in Unit 2, the instance to which the TRT and Region IV believe the allegor is referring.

5. Conclusion and Staff Positions:

a. |——————— Since an additional row of shear ties was placed to partially compensate for the missing reinforcing steel based on a G&H engineering evaluation, this omission would have no significant effect on structural safety.

b. The TRT concludes that since calculations were performed demonstrating that the wall would adequately carry the design loads this issue has no structural safety significance

c. The TRT finds the action taken to repair the bent and broken reinforcing bars to be acceptable and to have no adverse on the structural safety of the foundations.

d. TUEC is in the process of researching all of the documented cases of rebar omission for proper engineering disposition. The TRT can not determine the potential safety significance of this issue until it reviews these results

e. This issue has been referred to the TRT QA/QC group for programmatic Consideration.

f. The TRT supports the conclusion drawn by the Region II investigation into this issue and concludes this issue to have no Structural Safety Significance.

6. Action Required: None

[redacted]

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8. Attachments: None

9. Reference Documents:

1. DWG 2323-SI-0505 Rev 13
2. DWG 2323-SI-0519 Rev 4
3. DWG 2323-SI-0520 Rev 3
4. DWG 2323-SI-0570 Rev 4
5. DWG 2323-SI-0521 Rev 3
6. DWG SCB-10522 Shts 4, 5
7. DWG SCB-10519 Shts 1, 5
8. GTN-69753
9. Calculations SMI-1026 Set 2
10. NCR C-811
11. GHF-2183
12. DC/DDA 696
13. TWX-1122
14. NCR C-1314
15. DC/DDA 5080
16. NCR C-82-00523
17. GTN-59187
18. TWX-13520
19. DCA 13353

10. This statement prepared by:

T. Largowski, TRT
Technical Reviewer

Date

Reviewed by:

L. Shao,
Group Leader

Date

Approved by:

V. Noonan,
Project Director

Date

FOIA-85-59
C/261

SSER -

1. Allegation Tracking: Civil and Structural Issues - Concrete Strength

2. Allegation Number: AC-69, AC-71, AC-76

3. Characterization: Questions have been raised as to:

a. where 2500 psi concrete was used (AC-69);
b. whether structural analysis of the 2500 psi concrete was based on a strength of 2500 psi or 4000 psi (AC-71); and
c. whether Richmond inserts were installed in 2500 psi concrete (AC-76).

These questions surfaced during an interview with the alleger.

4. Assessment of Safety Significance:

This series of allegations was triggered by an investigation the alleger was carrying out on the integrity of Richmond anchor inserts. In the alleger's answer to applicant's statement of material facts relating to Richmond inserts (ASLB Docket Nos. 50-445-1 and 50-446-1) the alleger quotes the applicant as saying:

"While the concrete at CPSES is designed for

4000 psi. It actually ranges from 4500 to above 5000 psi."

Finding 6 records of strength records the allegor found a group of test results in which neither the standard cured nor field-cured cylinders attained a strength of 4000 psi at 28 days. In its review of mix design records the TRT discovered and informed the allegor that without exception the cylinders cited by the allegor were designed for a strength of 2500 psi rather than 4000 psi. All met their design strength. Since the applicant was in error in implying that all concrete at Comanche Peak was designed for a strength of 4000 psi, the questions within this category were raised. The findings are as follows:

a. The TRT consulted the Brown and Root computer printout which gives the pertinent data, including mix design and location of every concrete placement. It discovered that the use of 2500 psi concrete was confined to such uses as fill slabs or seal slabs. In no cases was it used in any of the following types of structures:

footings and mats
floor slabs on earth
floor topping
interior walls
exterior walls
columns

[illegible] slabs or beams
and slab or dome.

b. The structural elements listed above are those for which the 4000 psi design strength is applicable. There is no place where there was a possibility of applying 4000 psi design criteria to 2500 psi concrete.

c. The use of Richmond inserts was confined to the structural elements listed in 4a. above. All inserts were installed in 4000 psi concrete.

Conclusion and Staff Positions: There are no structural safety issues related to these allegations for the following reasons:

a. All the 2500 psi concrete was confined to non-structurally sensitive areas.
b. The 2500 psi concrete was not placed in areas where 4000 psi design criteria as applicable.
c. All Richmond inserts were installed in 4000 psi concrete. Apparently the applicant's statement of concrete strength, which raised the issue, was intended to apply to the concrete supporting Richmond inserts and not all the concrete at Comanche Peak.

The TRT interviewed the alleger at the time these questions were raised. There will be further contact to discuss the disposition of the questions.

6 Actions Required: None

[redacted]

(Attachments) None

Enclosure Documents:

a. ASLB Docket Nos 50-445-1 and 50-446-1
Notice and Order consisting of 1 consecutive pleadings

This statement prepared by: _____ Date
R. Phillips, TAT
Technical Reviewer

Reviewed by: _____ Date
Tae Y. Chao,
Group Leader

Approved by: _____ Date
Vincent Noonan,
Project Director

ALLEGATION CATEGORY: CIVIL AND STRUCTURAL Nº 24 CONCRETE COVER

ALLEGATION NUMBER: AC-54

. CHARACTERIZATION: QUESTIONS HAVE BEEN RAISED AS TO THE VALIDITY OF THE DISPOSITION OF DEFICIENCY & DISPOSITION REPORT (DDR) #C-502. (AC-54)

This question surfaced during an interview with the alleger.

. ASSESSMENT OF SAFETY SIGNFICANCE:

THE DEFICIENCY NOTED IN DDR #C-502 STATED .... "A LARGE NUMBER OF INTERIOR WALL DOWELS IN THE 773' MAT OF SAFEGUARD #2 (POUR #205-2773-001, DATED 6-17-76) ARE OUT OF TOLERANCE BY APPROXIMATELY 1/2" TO 1 1/2" TO THE NORTH OF THE EAST AND WEST COLUMN LINES...." THE DISPOSITION WAS "REPAIR" WITH THE FOLLOWING INSTRUCTIONS:

> USE 1/2" COVER ON VERTICAL BARS SHOWN ON SHEET 5(A)*. PLACE HORIZONTAL BARS ON INSIDE OF VERTICAL BARS FOR WALLS SHOWN ON SHEET 6(B)*. ALSO THICKEN WALL MARKED W-5 2" AS SHOWN. HEAT AND BEND BARS TO OBTAIN CLEARANCE AS SHOWN FOR WALLS ON SHEET 7(c)*.

A DESIGN CHANGE/DESIGN DEVIATION AUTHORIZATION (DC/DDA) #958 WAS ISSUED FOR GENERIC APPROVAL OF THE DISPOSITION OF DDR #C-502 AND WAS APPROVED BY THE G&H REPRESENTATIVE, THE RESPONSIBLE ENGINEER AND THE

*DRAWING #FSC-00295 SHEET 1 OF 1

Proj'd Engr:

The first two solutions, placing horizontal steel inside the vertical sled and thickening the wall, produce walls complying with the plans and specifications. The third solution, bending the dowels to place them in the proper position produces a satisfactory structure providing the stress in the bar is not high enough to spall the concrete. Calculations made at the time led the designers to believe that the dowels requiring bending were so scattered that undesirable stress concentrations would not occur. The fact that the structure has been in place for seven years and no spalling has been reported indicates that the designer's approach was adequate.

5. There is no structural safety issue related to this allegation, because the only potential adverse structural effect of the approved solution, spalling of concrete over the bent bars, has not occurred during the seven years since the solution was executed.

The TRT interviewed the alleger at the time this question was raised. There will be further contact to discuss its disposition.

6. Other Regulatory Issues.

[redacted]

8. Attachments: None

Reference Documents:

a. Deficiency and Disposition Report (DDR) C-502
b. Drawing FSE-007795
c. Design Change/Design Deviation Authorization (DCA/DDA) 958

10. This statement prepared by:

R. Blubaugh, TRT — Date
Technical Reviewer

Reviewed by

Larry Shao — Date
Group Leader

Approved by

Vincent Moran, — Date
Project Director

and associates, incorporated

April 15, 1977

Mr. Byron K. Kinkade
Robert W. Hunt Company
Route 1, Box 296
Glen Rose, TX 76043

Dear Mr. Kinkade:

The following individuals are certified as Level I inspectors in accordance with HT-513-30. This certification shall expire two years from this date.

NAME	SOCIAL SECURITY NUMBER
Jerry F. Beck	[redacted]
George F. Wilkins	
Charles E. Osborne	
Bobby L. Berry	
Stephen M. Davis	
Edward E. Dotson	
Joe W. Fielder	
Thomas S. Hutchinson	
Richard B. John	
W. D. "Jack" Lacy	
Paul D. Moore, Jr.	
Dewey T. Oliver, Jr.	
William R. Persinger	
Wylie Porterfield	
Eugene I. Ray	
Ira A. Scoggins	
John W. Williams	

7 C

Henry H. Sampson, Jr., P.E.
Level III
Inspection Engineer

/nv

FOIA-85-59
C/529

Insert "X"
An allegation is assessed as having no safety significance if based on technical findings a structure or a portion thereof will perform its intended functions regardless of whether or not it conforms with all design specifications

Draft 6 - 10/22/84
AQC-10 Category 7 - CP1

SSER

1. Allegation Category: Civil and Structural 7, Uncontrolled Repair

2. Allegation Number: AQC-10

3. Characterization: It is alleged that the removal of a Hilti bolt from the floor at the 852-foot level of the Safeguards Building resulted in a cone-shaped section of concrete being removed which was later repaired in an "uncontrolled manner."

4. Assessment of Safety Significance: The implied safety significance of this allegation is that, if it is true, the floor slab may not be capable of carrying the ~~deisgn~~ design loads. Insert X (See 1st page Cat #1)

In assessing this allegation, the NRC Technical Review Team (TRT) examined NRC Investigation Report 81-12 (April 16, 1982), which described the observations of the area in question by an NRC investigator and the senior resident inspector. They concluded that the floor was repaired with a surface patch rather than being repaired all the way through. Such an uncontrolled and undocumented repair of a portion of Category I structure may indicate a breakdown in QA/QC control.

The TRT concurred with these findings based on its observations of the floor area in question. Nevertheless, the TRT performed an independent evaluation of the safety significance of a 14-inch diameter hole extending through the floor slab adjacent to pipe support No. CC-1-137-700-E63R, as alleged. This hole is located in the Electrical and Control Building and not in the Safeguards Building, as alleged, and as reported in NRC Investigation Report 81-12.

For the worst-case analysis, the TRT assumed that two reinforcing steel bars (rebars) were cut in the process of removing the Hilti bolt. To account for the unknown quality of the material used in the repair, the

TRT computed the ultimate moment capacity of the floor slab with and without a 14-inch section of slab removed. These estimated strength capacities were compared to the strength requirements necessary to resist the actual moments resulting from the slab design loads. The adequacy of shear capacity was also verified in a similar manner. From these analyses, it was evident to the TRT that the capacity of the slab in question to resist actual design loads had not been impaired, even though the most conservative engineering assumptions concerning cut rebar and a 14-inch hole were made.

5. Conclusion and Staff Position: Based on observations made by the TRT, the floor slab does not show any sign of degraded capacity or of poor repair practices. The slab appears continuous and composed of good materials. An independent TRT analysis of the slab capacity, based on conservative engineering assumptions, confirmed that the structural integrity of the slab would be maintained under its design loads. Accordingly, this allegation has no safety significance. However, the results of this evaluation will be further assessed as a part of the programmatic review concerning procedures addressed under QA/QC Category 6, "QC Inspection." Therefore, the final acceptability of this evaluation will be predicated on the satisfactory results of the programmatic review of this subject. Any adjustments to the existing conclusion of this evaluation resulting from the programmatic review will be reported in a supplement to this SSER.

6. Actions Required: None.

[redacted]

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8. Attachments: None.

9. Reference Documents:

1. Brown & Root Drawing No. BRHL-CC-1-EC-020.
2. Brown & Root Drawing No. CC-1-137-700-E63R.

3. Gibbs & Hill Calculation No. SAB-103C.
4. NRC Investigation Report No. 81-12, April 16, 1982.

10. This statement prepared by:

J. Tapia, TRT
Technical Reviewer

1/14/85
Date

Reviewed by:

L. Shao,
Group Leader

Date

Approved by:

V. Noonan,
Project Director

Date

5

DRAFT 6 - 10/22/84
SSER Category No. 16/CP3

SSER

1. Allegation Category: Civil and Structural 16, Excavation and Backfill

2. Allegation Number: AQ-64

3. Characterization: It is alleged that over excavation and improper fill under the Unit 1 Containment Building could invalidate the expected seismic response of the foundation due to the change in properties resulting from the removal of in-situ material.

4. Assessment of Safety Significance: The implied safety significance of this allegation is that if it is true the quality of the concrete basemat may be indeterminate and its dynamic response characteristics may be affected appreciably. +INSERT X (See 1st page of Cat. #1)

During an investigation conducted in 1984, the NRC Office of Investigation (OI) interviewed the alleger (84-006, 3/7/84, A-7) and reference was made to over excavation and improper repairs in the foundation rock for the Unit 1 Containment Building. The alleger stated that the excavation was erroneously made 6 to 8 feet too deep and that upon realization of the error, the repair technique was simply to throw the loose rock back in to the excavation and fill it in with concrete.

The TRT reviewed NRC inspection reports, the FSAR, and the Atomic Safety and Licensing Board (ASLB) hearing transcript, where this concern was the subject of contention No. 7 and was admitted into the hearing on June 16, 1980.

By order of March 5, 1982, the ASLB granted summary disposition of contention No. 7, based on the finding that no genuine issue as to any material fact was shown by any of the filings. The TRT also reviewed the affidavits and statements filed by TUEC and by the NRC in support of the motion for summary disposition. These documents adequately describe rock

FOIA-85-59
C/585

overbreak, accompanying fissures, and subsequent repairs. Affected areas were backfilled with concrete having a minimum compressive strength of 2,500 pounds per square inch at 28 days, or were grouted to maintain continuity of the competent rock in which fissures were identified. The TRT reviewed procedures utilized to replace fractured rock with dental concrete and to grout surrounding fissures and the accompanying compressive test results. The TRT found that FSAR figures 2.5.4-33a through 2.5.4-35 are maps of the excavation showing the location of fractures and the extent of dental concrete backfill. These figures showed that the area of overexcavation represented a small portion of the entire excavated area. FSAR figure 2.5.4-37, sheets 1 through 21, showed photographs of the excavated walls. The TRT interviewed the NRC inspector who was present during the excavation process and verified the conditions presented in the FSAR.

The TRT independently evaluated the potential impact on the seismic response of the Unit 1 containment foundation due to the replacement of a limited amount of original rock with dental concrete from the standpoint of possible changes in foundation stiffness. Because of the fact that (a) the dental concrete's behavior, stiffness, and structural strength were essentially identical to those of the natural rock replaced at the site, as indicated by the foundation report, and (b) the area affected by the replacement work was relatively small (refer to FSAR Figures 2.5.4-33a through 2.5.4-35), the TRT determined that no appreciable impact on either the static or dynamic response characteristics of the foundation resulted from the over excavation. An affidavit prepared by a geotechnical engineer in the NRC's Office of Nuclear Reactor Regulation supports this conclusion. He provided his evaluation of the effects on static and dynamic foundation stability of replacing undisturbed limestone and claystone foundation rock with dental concrete. He concluded that the ability of the repaired foundation materials to withstand seismic disturbances had not been impaired.

5. Conclusion and Staff Positions: The TRT concludes that the over excavation of a small portion of the Unit 1 Containment Building foundation and the subsequent replacement of the affected area with 2500 psi strength

dental concrete and grout did not affect either the static or dynamic characteristics of the foundation. Therefore, the expected seismic response has not been invalidated as alleged. The excavation and repairs have had no safety impact upon foundation integrity. Accordingly, this allegation has neither safety significance nor generic implications.

6. Actions Required: None.

[redacted]

8. Attachments: None.

9. Reference Documents:

1. NRC Inspection Reports 75-05, 75-06, 75-07, 75-09, 76-05.
2. ASLB Hearing Transcript pages 78[illegible] to 1259.
3. ASLB Order Granting Summary Disposition of Contentions 2 and 7, March 5, 1982.
4. CPSES-FSAR.
5. Affidavit of Owen Thompson Contention 7.

10. This statement prepared by:

J. Tapia, TRT — Date 11/19/85
Technical Reviewer
11/20/84

Reviewed by:

L. Shao, — Date
Group Leader

Approved by:

V. Noonan, — Date
Project Director

Revision 1 CP3 10/22/84
Category No. 14/AE-17

SSER

1. Allegation Category: Civil and Structural 14, Control Room Area Deficiencies

2. Allegation Number: AE-17

failure of control room ceiling elements during a seismic event

3. Characterization: It is alleged that the field run conduit, the drywall, and the lighting installed in the area above the ceiling panels in the control room are classified as non-seismic and are supported only by wires and that these items may fall as a result of a seismic event.

4. Assessment of Allegation: The implied safety significance of this allegation is that if it is true, the ~~hazard to the control room operators~~ may cause injury to ~~them during seismic event~~ the control room operators and adversely impact plant safety. ← INSERT X (See 1st page Ref #1)

NRC The Technical Review Team (TRT) electrical group reviewed the electrical aspects of this allegation (Electrical and Instrumentation Category 4). The Civil and Mechanical group of the TRT evaluated the seismic aspects of this allegation.

General Design Criteria No. 19 requires that safe occupancy of the control room during abnormal conditions be provided for in its design. The Comanche Peak Steam Electric Station (CPSES) control room is in a seismic Category I structure, with certain seismic Category II and nonseismic components located in the ceiling. Seismic Category I refers to those systems or components which must remain functional in the event of an earthquake. Seismic Category II refers to those systems or components whose continued functioning is not required, but whose failure could reduce the functioning of any Seismic Category I system or component (as defined in Regulatory Guide 1.29) to an unacceptable level or could result in an incapacitating injury to occupants of the control room. Seismic Category II systems or components are, therefore, designed

and constructed so that a Safe Shutdown Earthquake (SSE) will not cause such failure or injury.

In assessing this allegation, the NRC TRT reviewed the CPSES nonsafety-related conduit, lighting fixtures, and the suspended ceilings installed in the control room. Three types of suspended ceiling exist in the control room: drywall, louvered, and acoustical. The following list designates those ceiling elements present in the control room and their seismic category designation:

1.	Heating, Ventilating and Air Conditioning	- Seismic Category I
2.	Safety-related Conduits	- Seismic Category I
3.	Nonsafety-related Conduits	- Seismic Category II
4.	Lighting Fixtures	- Seismic Category II
5.	Sloping Suspended Drywall Ceiling	- Nonseismic
6.	Acoustical Suspended Ceiling	- Nonseismic
7.	Louvered Suspended Ceiling	- Nonseismic

The TRT also examined the control room ceiling system and pertinent design drawings, and met with cognizant Texas Utilities Electric Company (TUEC) engineers on July 31, 1984, to discuss the specific seismic analyses performed for the ceiling elements. In addition, the TRT held a conference call on August 1, 1984, with principal Gibbs & Hill (G&H) design engineers (at which TUEC representatives were present) to discuss the design and calculation procedures for the ceiling elements.

The TRT determined that none of the suspended ceiling elements were considered to be either seismic Category I or II; however, TUEC had modified the sloping suspended drywall to add more support. G&H could not provide backup calculations to support this modification, nor could TUEC provide justification for their position that the remaining suspended ceiling elements (i.e., the louvered and acoustic elements) would not fall and cause an incapacitating injury to operating personnel.

This would indicate failure of the quality assurance program to ensure that applicable provisions of Regulatory Guide 1.29 were fully met.

The TRT requested backup calculations for the sloping suspended drywall. TUEC provided the calculations on August 3, 1984, along with the calculation packages for the lighting fixtures, the nonsafety-related conduits larger than 2 inches in diameter, and the safety-related conduit. The TRT reviewed these calculations, except those for the safety-related conduit since they were designated as seismic Category I and therefore were excluded from the scope of this review.

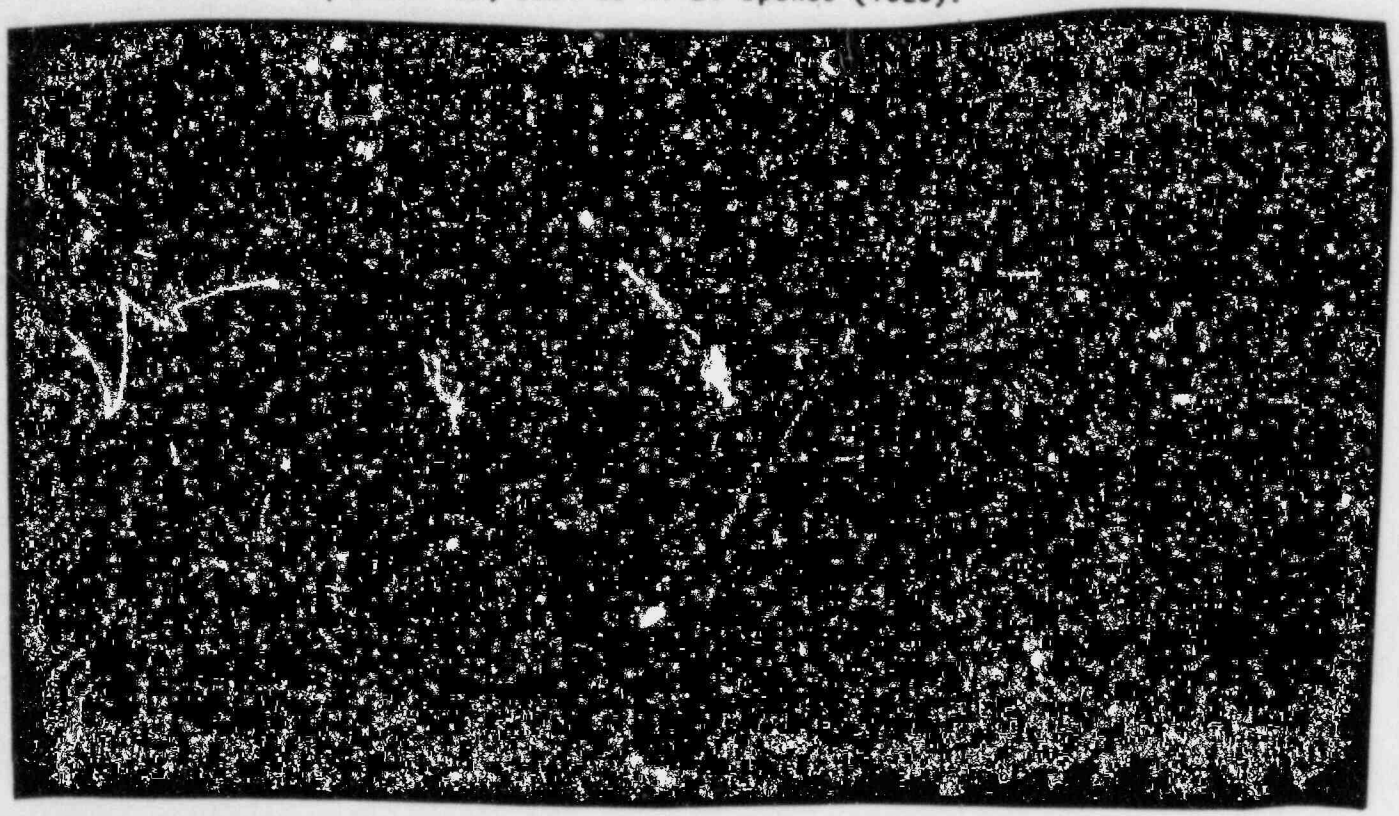
The TRT found that nonsafety-related conduits that were less than or equal to 2 inches in diameter were not supported by redundant seismic Category II cable restraints. The TRT also verified the adequacy of calculations for the nonsafety-related conduits larger than 2 inches in diameter.

The TRT found that the G&H calculations were based on the equivalent static load method, which involves multiplication of the dead weight of an item by an appropriate seismic acceleration coefficient. This equivalent static load calculation did not take into account the influence from the adjoining suspended ceilings on the calculated response. This was significant because redundant cable supports were not provided for the suspended louvered and acoustical ceilings, and the impact from the accelerations of the lighting fixtures was not considered in any analysis. The ceiling, as a whole, manifested a more complex configuration than that assumed in the equivalent static load analysis in that the effects from adjoining suspended ceilings were not considered. A justification based on the seismic response characteristics of the entire ceiling, which would account for the frequency content and amplification characteristics of the seismic motions, as represented by floor response spectra, is required to justify the value of the seismic acceleration coefficient used.

5. Conclusions and Staff Position: The TRT found that not all items in the Control room ceiling fall under the seismic Category I or II designation. Specifically, these items are the suspended drywall, acoustical and louvered ceilings. These components designated as nonseismic do not satisfy the provisions of Regulatory Guide 1.29 since they were not designed to accommodate seismic effects. Nonsafety-related conduits that are 2 inches in diameter and less also were not designed to accommodate seismic effects. TUEC presented no evidence which showed that the effect of failure of these items had been considered.

   The TRT concludes that calculations supporting the seismic Category II lighting fixtures do not adequately reflect the rotational interaction with the non-seismic items. In addition, the fundamental frequencies of the supported masses were not calculated to determine the influence of the seismic response spectrum at the control room ceiling elevation.

6. Actions Required: See Item II.d in the enclosure to the D. Eisenhut letter of September 18, 1984 to M. D. Spence (TUEC).



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8. Attachments: None.

9. Reference Documents:

1. Calculation No. SCS-171C, Set No. 2, "Seismic Restraint of Lighting Fixtures," pages 1-37, dated January 14, 1981.
2. Design Change Authorization No. 10757, dated August 10, 1981.
3. Regulatory Guide 1.29, "Seismic Design Classification."
4. Texas Utilities Services, Inc. (TUSI) letter CPPA-11, 410, dated July 22, 1981.
5. Gibbs & Hill letter GTT-7965, dated August 7, 1981.
6. TUSI memorandum CPPA-40, 224, dated August 3, 1984.

10. This statement prepared by:

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Technical Reviewer

Date 1/4/85

C. Hofmayer, TRT
Technical Reviewer

Date 12/19/84

Reviewed by:

L. Shao,
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Date

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Date