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U. S. NUCLEAR REGULATORY COMMISSION

~~U.S. DEPARTMENT OF ENERGY~~ OR (X OUT ONE)

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SAT-3

Comments on Comanche Peak Response Team Action Plan

1. Page 10 of the Program Plan ~~indicates~~ mentions "the desirability of obtaining an external perspective." Explain how this goal is achieved in each issue-specific action plan.

2. With regards to Item II.6 - Concrete Compression Strength:

   (a) The action plan does not take into account the fact that more than one strength of concrete may have been placed between January 1976 and February 1977. Both 4000 psi and 2500 psi concrete were used on the project. If both are present in the tested concrete they must be analyzed separately.

   (b) The action plan contemplates conversion of rebound numbers to compression strength by use of the calibration curve supplied by the manufacturer. Since there is a high degree of uncertainty associated with the application of a general calibration curve to a particular set of materials, the statistical analysis should be carried out directly using the recorded rebound numbers.

2. (c) Paragraph 4.(5) mentions comparison testing of concrete placed outside the time frame in question. To eliminate age effects this concrete should match the age of the concrete in question as closely as possible. Preferably concrete placed before the end of 1977 should be used.

(d) The sampling plan stipulates that 50 placements from both the concrete in question and the concrete not in question will be tested. This number is adequate, but there is no mention of the number of tests to be run on each placement. The plan should state the number of test cores on each placement where concrete is in question and the number of test cores on each placement where it is not. As explained in Item 2(c), a sufficient number of tests on each placement where the concrete is in question should be performed to substantiate the quality of each individual placement.

(e) Because the allegation being investigated is that some individual tests were falsified, the strength results for the period in question should not be regarded as a single population. The mean values for individual placements should be compared with the mean of the concrete not in question at the 5% level of significance.

2 (f) Submit QI-QP-2.5-7, "Determination of Strength of Concrete by Use of the Concrete Test Hammer" and QI-QP-13.0-5, "Verification of Concrete Test Hammer".

(g) As noted in Section 5, the program for performing these tests should be submitted to the NRC staff prior to performing the tests.

3. With regard to Item II.C - Maintenance of Air Gap Between Concrete Structures

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(a) Paragraph 4.(1) should indicate that QC inspections of the seismic gaps will be performed for all Category I structures

(b) Paragraph 4.(3) indicates that the original analyses were based on clear gaps, but that subsequently the design engineer evaluated the portions of the separation areas for the effects of the presence of roof beam. Clarify what areas were evaluated and when these evaluations were performed. Submit these evaluations with the overall response to this issue.

(c) Paragraph 4.(3) and the Decision Criteria should indicate that changes in seismic response (i.e. effects of loads transferred between buildings) will be evaluated.

3. (d) Describe more fully what is meant by the statement that "QC will document the debris characteristics on a "best-effort" basis, using conservative estimations as needed."

(e) Submit the revised procedure QI-QP-11.0-3, "Concrete or Mortar Placement Inspection".

4. With regard to Item II.d - Seismic Design of Control Room Ceiling Elements

(a) Provide details of the new horizontal seismic restraints discussed in Paragraph 4.(a)(1) and explain what is going to replace the gypsum panels as discussed in Paragraph 4.(a)(2).

(b) Describe the seismic analyses, including the details of the dynamic models that will be used to evaluate the ceiling structures.

(c) It should be clearly demonstrated that the non-safety related conduit support system on the control room for conduit 2 inches or less is covered by the generic analyses ~~described~~ discussed in Paragraph 4.(b) of Item I.C.

4. (d) The Standards/Acceptance Criteria should be more explicit as to the analysis and design criteria that will be utilized in evaluating the existing structures (Item II.2.d) and the non-safety-related conduit (Item I.C).

(e) The ~~approach~~ results of the review described in Paragraphs 4(C)(1) and 4(C)(2) to address the adequacy of the treatment of Category II and non-seismic structures, systems and components elsewhere in the plant should be audited by an independent review team consisting of engineers not involved with the original evaluations. The details of these audits and findings should be submitted to the NRC for review. The TRT will then conduct an independent audit to confirm these findings.

2.1.1 Civil and Structural Team Summary

2.1.1.1 Scope of Allegations

The allegations in the civil and structural discipline concerned most aspects of reinforced concrete construction and testing. The 57 allegations could be classified in six broad areas: design deficiency (see allegation AE-17); testing or inspection irregularities (see allegations AQC-1, AQC-2, AQC-3, AQC-4, AQC-5, AQC-6, AQC-7, AQC-8, AQC-9, AQC-11, AQC-12, AQC-46, AQC-48, AQC-51 AC-37); incorrect construction practices (see allegations AC-16, AC-18, AC-19, AC-20, AC-21, AC-22, AC-23, AC-24, AC-27, AC-28, AC-29, AC-30, AC-31, AC-35, AC-36, AC-38, AC-39, AC-40, AC-43, AC-47, AC-49, AC-50, AQC-13, AQC-14, AQC-15, AQC-45, DC-003, DC-004, DC-005); inadequate repairs (see allegations AC-32 and AQC-10); uncorrected, unsafe conditions in the completed structure (see allegations AC-25, AC-33, AC-34, AC-41, AC-44, AC-52, AQ-64, DC-008, DC-009); and premature structural loading (see allegation AC-26).

Of the above 57 allegations, the TRT determined that five allegations should be classified as open issues. Open issues are items that may have potential safety significance and require action on the part of TUEC. The open issues are: (1) reinforcing steel omitted in the reactor cavity (DC-003); (2) falsification of concrete compression strength test results (AQC-7); (3) maintenance of air gap between concrete structures (AC-41); (4) seismic design of control room ceiling elements (AE-17); and (5) unauthorized cutting of rebar in the fuel handling building (AQC-15).

In addressing the allegations, the Civil and Structural Team characterized the allegations as specifically as possible and grouped allegations related by subject into common categories. There were a total of 17 such categories.

2.1.1.2 The Civil and Structural Team

Members of the Civil and Structural Team were selected for their technical expertise and experience in design, construction, quality assurance, and ability to detect discrepancies in construction records. The team consisted of two NRC employees and four consultants, all of whom are Civil and Structural engineers, with a combined total of 107 years of experience in general design and in nuclear and non-nuclear heavy construction work.

2.1.1.3 Findings for Civil and Structural Issues

There is one allegation (AE-17) that the control room design was deficient because the failure of the suspended ceiling, lighting fixtures and non-safety related conduit built over the control room could reduce the functioning of ~~any~~ Seismic Category I systems or components to an unacceptable level or could result in an incapacitating injury to occupants of the control room.

The TRT investigated the seismic design of the ceiling elements installed in the control room. The following matrix 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	- Non-Seismic
6. Acoustical Suspended Ceiling	- Non-Seismic
7. Lowered Suspended Ceiling	- Non-Seismic

According to Regulatory Guide 1.29 and FSAR Section 3.7B.2.8, the Seismic Category II and non-seismic items should be designed in such a way that their failure would not adversely affect the functions of safety-related components or cause injury to operators.

For the non-seismic items (other than the sloping suspended drywall ceiling), and for nonsafety-related conduits whose diameter is 2 inches or less, the TRT could find no evidence that the possible effects of a failure of these items had been considered. In addition, the TRT determined that calculations for Seismic Category II components (e.g., lighting fixtures) and the calculations for the sloping suspended drywall ceiling did not adequately reflect the rotational interaction with the non-seismic items. Nor were the fundamental frequencies of the supported masses determined to assess the influence of the seismic response spectrum at the control room

ceiling elevation on the seismic response of the ceiling elements.

Accordingly, TUEC shall provide: (1) The results of seismic analysis which demonstrate that the non-seismic items in the control room (other than the sloping suspended drywall ceiling) satisfy the provisions of Regulatory Guide 1.29 and FSAR Section 3.7B.2.8; (2) An evaluation of seismic design adequacy of support systems for the lighting fixtures (Seismic Category II) and the suspended drywall ceiling (non-seismic item with modification) which accounts for pertinent floor response characteristics of the systems; (3) Verification that those items in the control room ceiling not installed in accordance with the requirements of Regulatory Guide 1.29 satisfy applicable design requirements; (4) The results of an analysis that justify the adequacy of the nonsafety-related conduit support system in the control room for conduit whose diameter is 2 inches or less, and (5) The results of an analysis which demonstrate that the foregoing problems are not applicable to other Category II and non-seismic structures, systems and components elsewhere in the plant.

Of the allegations related to testing and inspection irregularities, all but one were found to be without safety significance or generic implications. The TRT investigated an allegation (AQC-7) that concrete strength tests were falsified. The TRT reviewed an NRC Region IV investigation (IE Report No. 50-445/79-09; 50-446/79-09) of this matter that included interviews with 15 individuals. Of these, only the alleger and one other individual stated they thought that falsification occurred,

but they did not know when or by whom. The TRT also reviewed slump and air entrainment test results of concrete placed during the period the alleger was employed (January 1976 to February 1977) and did not find any apparent variation in the uniformity of the parameters for concrete placed during this period. Although the uniformity of the concrete placed appears to minimize the likelihood that low concrete strengths were obtained, other allegations were raised concerning the falsification of records associated with slump and air content tests. The Region IV staff addressed these allegations by assuming that concrete strength test results were adequate. Furthermore, a number of other allegations dealing with concrete placement problems (such as deficient aggregate grading and concrete in the mixer too long) were also resolved by assuming that concrete strength test results were adequate. The TRT agrees with Region IV that, while the preponderance of evidence suggests that falsification of results did not take place, the matter cannot be resolved completely on the basis of concrete strength test results, especially if there is any doubt about whether they may have been falsified. Due to the importance of the concrete strength test results, the TRT believes that additional action by TUEC is necessary to provide confirmatory evidence that the reported concrete strength test results are indeed representative of the strength of the concrete installed in the Category I concrete structures.

Accordingly, TUEC shall determine areas where safety-related concrete was placed between January 1976 and February 1977, and provide a program to assure acceptable concrete strength. The program shall include tests such as the use of random Schmidt hammer tests on the concrete in areas where safety is critical. The program shall include a comparison of the results with the results of tests performed on concrete of the same design

strength in areas where the strength of the concrete is not questioned, to determine if any significant variance in strength occurs. TUEC shall submit the program for performing these tests to the NRC for review and approval prior to performing the tests.

An allegation (AQC-9) that recertification tests were given "open book" was judged to have little safety signficance because of the multiplicity of inspections by individuals with acceptable qualifications compared with those alleged to have questionable qualifications. Allegations (AQC-1, AQC-2, AQC-3) that slump, air content, and aggregate tests for concrete were falsified were resolved by establishing that the concrete was of high quality, a finding verified by strength test results. A similar allegation (AQC-46) that required tests on concrete in midpour were falsified was resolved in the same manner. An allegation (AQC-2) that tests of small concrete placements were not performed was resolved by a review of concrete placement packages of 10 cubic yards or less and by verification that the required testing had been performed and that the test cylinder strengths met the specification. The allegation (AQC-2) that a Level II inspector signed reports for tests which he did not witness was resolved by a file search by Region IV inspectors which revealed no such reports were signed by the Level II inspector on the dates alleged. An allegation (AQC-2) that a pressure gauge certification test was signed by an unqualified individual was resolved by demonstrating that the test was performed by Brown & Root personnel following Brown & Root approved procedures and that the alleger only observed the test. Allegations (AC-37 and AQC-12) that reinforcing steel was installed prior to proper receipt inspection was resolved by

referring to testimony given by the alleger to the effect that the reinforcing steel was properly inspected and approved. An allegation (AQC-51) that an inspector reported results of Cadweld tests without actually running the tests was resolved by demonstrating that those who performed the Cadwelds in question had a satisfactory record of producing acceptable Cadwelds. Furthermore, the Cadwelds in question were made for the Unit 1 containment structure, which was demonstrated by an overall pressure test to have adequate strength.

An allegation (AQC-4) that one set of testing equipment sat unused for months was resolved when laboratory test records of all the required test results were discovered. An allegation (AQC-5) of a shortcut in aggregate sieve analysis was resolved by the demonstration that the shortcut alleged is permitted in the ASTM test procedure. An allegation (AQC-6) that some concrete in the largest placement on the project was inadequately tested was resolved by the discovery in the concrete placement package of a record of all required tests. An allegation (AQC-8) that in some concrete cylinder strength tests the testing machine was run too fast was shown to be without safety significance because operating the testing machine on the project at its maximum possible rate would not have changed test results enough to change any cylinders from acceptable to unacceptable. An allegation (AQC-11) that concrete test cylinders from acceptable placements were switched to questionable placements was shown to have no significance because the small number of cylinders available for switching, even had they been switched, would have no impact on safety. An allegation (AQC-48) that cylinders in the moist room were permitted to dry was resolved by

noting the negligible effect on the moist room humidity during a brief shutoff of the water supply to the moist room.

The allegations related to incorrect construction practices, with one exception (AQC-15), were found to be without safety significance. An allegation (AC-38) that reinforcing steel (rebar) had been omitted near the top of the Unit 1 containment structure was resolved by inspection of the concrete placement packages for Unit 1 which showed the reinforcing steel was installed as required. The TRT concluded that the alleger was referring to an occurrence in Unit 2, where such an omission did occur. Although the reinforcing steel in Unit 2 was placed at a higher elevation, it was shown by analysis to be adequate. An allegation (AC-39) of omitted reinforcing steel in the auxiliary building was resolved by a structural analysis which demonstrated that the structure was safe as built. An allegation (AC-49) that reinforcing steel was installed upside down in a building near the Unit 2 containment structure was resolved when the alleger acknowledged that the problem was corrected prior to the concrete being placed. An allegation (AC-30) that reinforcing steel was omitted from a 6-foot x 6-foot section of concrete in the Safeguards Building was resolved when the TRT learned during an interview with the alleger that the allegation pertained to the return pump station at Squaw Creek Dam. A review of rebar placement checklists contained in the concrete placement packages for Squaw Creek Dam showed all the reinforcing steel was installed and inspected as required.

Five allegations relate to the undocumented and unauthorized drilling of holes through reinforcing steel. Four of the allegations (AQC-13, AQC-14, AC-18, AC-40) were not specific either about who performed the unauthorized drilling or where the drilling took place. However, the number of instances alleged, if true, would have an inconsequential effect on the safety of the structures. The fifth allegation (AQC-15) about drilling reinforcing steel during the installation of trolley rails in the Fuel Building cannot be closed at this time. The claim is that during the installation of 22 metal plates, a core drill was used to drill about 10 holes approximately 9 inches deep. The TRT reviewed the reinforcement drawings for the Fuel Handling Building and determined that there were three layers of reinforcing steel in the top reinforcement layer of the slab. This reinforcement layer consisted of a No. 18 bar running in the east-west direction in the first and third layers, and a No. 11 bar running in the north-south direction of the second layer. The review also revealed that the layout of the reinforcement and the trolley rails was such that the east-west reinforcement would interfere with the drilling of holes along only one rail location. However, if 9-inch holes were drilled, both the first and third layers of No. 18 reinforcement would be cut. A Design Change Authorization (DCA) was written for authorization to cut the uppermost No. 18 bar at only one rail location, but did not reference authorization to cut the lower No. 18 bar. The DCA also stated that the expansion bolts and base plates may be moved in the east-west direction to avoid interference with reinforcement running in the north-south direction. If the 10 holes were actually drilled 9 inches deep, then the allegation that the reinforcement was cut without proper authorization would be valid.

Accordingly, TUEC shall provide: (1) Information to demonstrate that only the No. 18 reinforcing steel in the first layer was cut, or (2) Design calculations to demonstrate that structural integrity is maintained if the No. 18 reinforcing steel on both the first and third layers was cut.

Four other allegations (AC-16, AC-22, AC-23, AC-50) having to do with use of rejected aggregate and the placement of "bad" or "sloppy" concrete were resolved by reviewing documentation in the pertinent concrete placement packages which demonstrated that, for all concrete accepted for placement in the forms, test results for both fresh and hardened concrete complied with specification requirements. Two allegations (AC-24, AC-36) were about construction irregularities during placement of concrete in the dome of the Unit 1 containment structure. One concerned concrete placement during a rainstorm and the other was that trash was thrown in the concrete form during a Christmas party. These were shown to be without safety significance based on the results of the Unit 1 structural integrity test, which demonstrated adequate structural performance by the entire containment structure. Two allegations (AC-28, AC-35) of improper concrete placement during cold weather were resolved, either by documentation of concrete protection in the concrete placement packages or by rebound hammer tests, which compared the strength of questionable concrete with that of acceptable concrete in areas where documentation was not conclusive. An allegation (AC-19) that unauthorized water was added to concrete truck mixers proved to be an administrative problem rather than a safety problem in that the proper signatures were not obtained. In no case was the allowable water-cement ratio exceeded. An allegation (AC-21) of excessive concrete slump proved to result from a misunderstanding of the slump

specification by the alleger. An allegation (AC-29) that a section of the outlet works at the Squaw Creek Dam was placed 75° out of alignment was found to be untrue by a visual examination of the finished structure. AC-29 and allegations (AC-20, AC-47) of rejected concrete used in the Unit 1 turbine generator building and circulating water intake structure pertain to nonsafety-related structures. An allegation (AC-31) that hanger inserts were installed at improper angles resulted from a misunderstanding by the alleger of hanger installation requirements.

Finally, the allegation (AQC-45) that batch weights in the concrete batch plant were biased by someone tampering with the wire connecting the weight hoppers to the scale dials was evaluated by measuring the effect of such deflection when the hoppers were full. The tampering was shown to have a negligible effect on the material being weighed and, thus, could have no impact on safety.

In addition to the above allegations, The TRT assessed eight documented cases (DC-003, DC-004, DC-005) of incorrect construction practices. The cases were investigated based on information obtained from the NRC Resident Reactor Inspector at Comanche Peak. The case of reinforcing steel omitted from a Unit 1 reactor cavity placement cannot be closed at this time. Reinforcing steel was omitted from a Unit 1 reactor cavity concrete placement between the 812-foot and 819-foot, ½-inch elevations. This reinforcement was installed and inspected according to drawing 2323-S1-0572, Revision 2. However, after the concrete was placed, Revision 3 to the drawing was issued showing a substantial increase in reinforcing

steel over that which was installed. Gibbs & Hill Engineering was informed of the omission by Brown & Root Nonconformance Report CP-77-6. Gibbs & Hill Engineering stated that the omission in no way impaired the structural integrity of the structure. Nevertheless, the additional reinforcing steel was added as a precaution against cracking which might occur in the vicinity of the neutron detector slots should a loss of coolant accident (LOCA) occur. A portion of the omitted reinforcing steel was placed in the next concrete lift above the 819-foot, ½-inch level. This was done to partially compensate for the reinforcing steel omitted in the previous concrete lift and to minimize the overall area potentially subject to cracking.

The TRT requested documentation indicating that an analysis was performed supporting the Gibbs & Hill conclusion. The TRT was subsequently informed that an analysis had not been performed. Therefore, the TRT cannot determine the safety significance of this issue until an analysis is performed verifying the adequacy of the reinforcing steel as installed.

Accordingly, TUEC shall provide an analysis of the as-built condition of the Unit 1 reactor cavity that verifies the adequacy of the reinforcing steel between the 812-foot and 819-foot, ½-inch elevations. The analysis shall consider all required load combinations.

One case (DC-003) involved the substitution of circular reinforcing bars for bent bars. This substitution was determined to have no adverse effect on the load-carrying capacity of the structure. The case (DC-005) of the requested substitution of #5 for #8 vertical reinforcing bars in the two

corners of a wall was resolved by a review of documentation which showed that the #8 reinforcing bars were installed as required. In a case (DC-003) regarding reinforcing steel in the triangular columns surrounding the reactor cavity, the modifications made to the bars were found to be acceptable and to meet the intended purpose. Reinforcing steel omitted from a beam in the Auxiliary Building (DC-004) was found to be satisfactory after an examination of the requirement of the designer to leave certain shoring in place for a longer period of time than normal. Two cases (DC-004, DC-005) of omitted reinforcing bars around an elevator shaft and on the face of the wall in the excess letdown heat exchanger room in the Unit 1 Reactor Building were resolved by confirming that the missing steel was subsequently placed by drilling and grouting. Finally, a case (DC-005) involving reinforcing steel omitted from the top of a wall opening in Safeguards Building No. 1 was found acceptable since, through a redesign which reduced the size of the opening, it was possible to place all of the required steel.

Two allegations that inadequate repairs were made to concrete sections were found to be without safety significance or generic implications. The first allegation (AQC-10) was that the hole resulting from the removal of an anchor bolt from a structural floor slab in the Electrical Control Building was repaired in an uncontrolled manner, thus leaving the slab in an unsafe condition. A structural analysis of the repair found the slab to be adequate structurally under the worst-case condition, that is, with all possible reinforcing bars cut and with no structural credit given to the repair material. The second allegation (AC-32) was that defective concrete

was not adequately repaired. An audit of the repair log in the concrete placement package and visual examination of the repaired areas verified that the repair was adequate.

Of the allegations related to uncorrected unsafe conditions in the completed structure, the allegation (AC-41) that poor workmanship in the installation and removal of temporary foam spacers between buildings left them with inadequate spacing to function as designed during an earthquake cannot be closed at this time. The TRT investigated the design requirements about maintaining an air gap between concrete structures. Based on the review of available inspection reports and related documents, on field observations, and on discussions with TUEC engineers, the TRT cannot determine whether an adequate air gap has been provided between concrete structures. Field investigations by B&R QC inspectors indicated unsatisfactory conditions due to the presence of debris in the air gap, such as wood wedges, rocks, clumps of concrete and elastic joint filler materials. The disposition of the NCR relating to this matter states that the "field investigation reveals that most of the material has been removed." However, the TRT cannot determine from this report (NCR C-83-01067) the extent and location of the debris remaining between the structures.

Based on discussions with TUEC engineers, it is the TRT's understanding that field investigations were made but that no permanent records were maintained. In addition, it is not apparent that the permanent installation of elastic joint filler material ("rotofoam") between the Safeguards Building and the Reactor Building, and below grade for the

concrete structures, is consistent with the seismic analysis assumptions and dynamic models used to analyze the buildings, as these analyses are delineated in the Final Safety Analysis Report (FSAR). The TRT, therefore, concludes that TUEC has not adequately demonstrated compliance with FSAR Sections 3.4.1.1.1, 3.8.4.5.1, and 3.7.B.2.8, which require separation of Seismic Category I buildings to prevent seismic interaction during an earthquake. Accordingly, TUEC shall: (1) perform an inspection of the as-built condition to confirm that adequate separation for all Seismic Category I structures has been provided, and (2) provide the results of analyses which demonstrate that the presence of rotofoam and other debris between all concrete structures (as determined by inspections of the as-built conditions) does not result in any significant increase in seismic response or alter the dynamic response characteristics of the Category I structures, components and piping when compared with the results of the original analyses.

An allegation (AC-44) of two unsafe cracks in the supporting structure at the base of the reactor vessel was resolved by demonstrating that the structure is designed to tolerate those cracks. A more general allegation (AC-33) of cracks in floor slabs in several parts of the plant was investigated by an examination of concrete placement records and by a visual examination of the cracks. These examinations showed that specifications were not violated. that the cracks are no more numerous than on normal concrete construction and that they have no structural safety significance. An allegation (AQ-64) that over-excavation and improper fill under the Unit 1 containment structure had created a seismic response

condition different from that assumed in the building design was resolved by an analysis which demonstrated that the backfill material was similar in elastic properties to the foundation rock, and that the amount of material removed relative to the size of the structure was small, so that seismic response remained essentially unchanged. An allegation (AC-25) that there were voids in the concrete adjacent to the stainless steel liner in the Unit 2 containment structure is correct, but the situation has been corrected by replacing the defective concrete. An allegation (AC-34) of voids in walls detected by sounding with a hammer was resolved by removal of suspect concrete and a demonstration that the sounding technique was invalid. A reported void in a steam generator compartment wall (DC-008) was confirmed and filled. A report of embedded foreign material in concrete (DC-009) proved to be pipe insulation required by the design. An allegation (AC-52) that both laboratory and field-cured concrete test cylinders failed to attain the required 28-day strength was resolved by demonstrating that the alleged failure of laboratory-cured cylinders resulted from a misunderstanding of the design strength by the alleger and that the field-cured strengths, while below specification limits, had adequate strength for structures which do not receive their full load at an early age.

A single allegation (AC-26) concerned the premature loading of grouted steel plates. The allegation was shown to be without safety impact or generic implication because an inspection of the grout pads showed no failures. Failure, if it had occurred, would have taken place soon after loading since the grout gains strength rapidly when it is young.

Two allegations (AC-27, AC-43) contained no new issues; they reiterated issues raised by other allegations.

2.1.1.4 Conclusions and Required Actions

The technical review team concludes that the civil and structural construction was well executed and was, for the most part, well documented. However, five issues require further action. One case of reinforcing steel omitted from the reactor cavity wall and one case of alleged unauthorized drilling of reinforcing steel require further documentation. It will be necessary to test concrete in place to evaluate an allegation concerning falsified concrete strength tests. Analyses and inspections will be required to determine whether the separation between buildings is adequate to provide adequate performance in an earthquake. Finally, there must be a seismic analysis of the suspended ceiling, lighting fixture and non-safety related conduit in the control room to demonstrate design adequacy of the ceiling elements. The potential safety implications of this issue for nonseismic structures, systems and components in other parts of the plant must also be evaluated.