

U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT

REGION IV

Report: 50-445/84-03; 50-446/84-01

Dockets: 50-445; 50-446

Licensee: Texas Utilities Generating Company  
2001 Bryan Tower  
Dallas, Texas 75201

Facility Name: Comanche Peak, Units 1 and 2

Inspection at: Comanche Peak Site, Glen Rose, Texas

Inspection Conducted: January 30 - February 3, 1984

Inspectors: *J. C. Higgins* 2/23/84  
J. C. Higgins, Reactor Inspection Specialist Date  
*V. Lettieri* 2/23/84  
V. Lettieri, Nuclear Engineer Date

Approved: \_\_\_\_\_ Date \_\_\_\_\_  
D. M. Hunnicutt, Chief, Reactor  
Projects Section A

Inspection Summary

Inspection Conducted January 30 - February 3, 1984  
(Report No. 50-445/84-03:50-446/84-01)

Areas Inspected: Special announced inspection of the protective coatings program in Units 1 and 2. The inspection involved seventy inspector-hours by two contract inspectors from Brookhaven National Laboratory.

Results: No violations or deviations were identified.

## COMANCHE PEAK-TRIP REPORT

### 1. Summary

This special inspection was conducted by two Brookhaven National Laboratory (BNL) Engineers under contract to NRC, Region IV, in order to address allegations regarding coatings inside the primary containment at Comanche Peak. The inspection was to address the technical aspects of any coatings allegations and problems and to review various aspects of past and present coatings application and inspection activities at Comanche Peak. The inspectors interviewed various personnel involved with the engineering, purchasing, application, testing, and inspection of coatings. The inspection also included tours of the facility; witnessing of surface preparation, coating application, and coating inspection; and review of various documents, such as procedures, specifications, qualification and test data, and inspection reports.

### 2. Background

#### 2.1 Source of Information

Based on a review of three documents, a number of concerns regarding the protective coatings at Comanche Peak Steam Electric Station have been identified. One document is an interview with Individual A conducted - Monday, November 21, 1983 and various statements made by that individual. A second document is a Report of Investigation, dated August 24, 1983, entitled Comanche Peak Steam Electric Station: Intimidation of Coatings QC Personnel, Case Number 4-83-001. In this report, various individuals made statements that include technical concerns. The third document is an interview with Individual J conducted - Wednesday, January 4, 1984 and various statements made by that individual. The individuals involved have requested that their identities be held confidential.

### 3. Persons Contacted

- \* J. Firtel - (EBASCO) - Principal Corrosion Engineer
- \* J. Hicks - (TUGCO) - Site QA/QC
- \* T. Kelly - (EBASCO) - Principal Corrosion Engineer
- M. Krisher - (TUGCO) - Reactor Building QC Supervisor
- \* J. Merritt - (TUGCO) - Assistant Project General Manager
- R. Murray - (TUGCO) - Construction Manager
- \* R. Tolson - (TUGCO) - Construction QA Supervisor
- W. Ward - (TUGCO) - Assistant Reactor Building Manager

The inspector also held discussions with other licensee and contractor personnel including management, engineering, quality control, construction, and testing personnel.

\*Present at exit meeting on 2/3/84.

4. Coatings Program

In order to assist in the performance of an effective review of the various allegations relating to coatings, the inspectors reviewed the current site organizations associated with the application and inspection of coatings in the Reactor Building. The inspectors also held discussions with personnel at all levels of the organization. Unit 1 coatings work is now essentially all repair of previously applied work and is being handled through a matrix organization by building. Coatings procedures for Unit 1 have been rewritten in January, 1984 time frame and are now separate from the Unit 2 procedures. Very little Unit 2 coatings work is currently underway. Unit 2 work is currently being organized and planned and will commence at a later date. The inspectors briefly discussed with personnel the status of backfit inspections being performed on both units to determine which areas required coatings rework.

5. Allegation Details (see Attach. 1 for complete wording of each allegation)

5.1 Allegations Under Review

Allegations number 2, 3, 4, 5, 6, 7, 8, 10, 11, 12 and 17.

5.2 Allegations Requiring Additional Information

5.2.1 To resolve allegations Number 1 and 15 will require either data that demonstrates these systems are Design Basis Accident (DBA) and Irradiation qualified per ANSI N101.2-1972 or justification that demonstrates the total area involved with these systems is insignificant.

5.2.2 To resolve allegation Number 9 will require additional coating qualification information which the licensee stated he would send.

5.2.3 To resolve allegation Number 13, BNL has received TWX No. 9108908660, dated March 10, 1983 to J. R. George/M. R. McRay/R. M. Kissinger/M. Wells from R. E. Ballard/M. Chiruvolu/K. Falk, which states that lack of neutron radiation qualification is not a problem for the reactor cavity coatings, since post-LOCA water and paint will flow into vice out of the cavity. The inspectors requested detailed calculations/justifications which supported these conclusions.

5.3 Allegation Number 14

It has been alleged that the nonconformance control system is inadequate in that: coatings inspector cannot write NCRs but must use unsatisfactory Inspection Reports (IRs); unsatisfactory IRs can be dispositioned by anyone; NCRs do not have to be signed off by the person writing them; and the IR system does not ensure problems are tracked, resolved, and generic problems are identified.

### 5.3.1 Status

The inspector performed a partial review of these allegations and concluded that, while some of the alleged conditions existed, no significant problem resulted. Some additional inspection work is still required and some areas needing improvement were identified.

During the review of this area, the inspector held discussions with the Site Quality Assurance (QA) Supervisor, Quality Control (QC) Supervisors, QC Inspectors and other various site personnel. The inspector also reviewed the following documents:

- 10 CFR 50.55e Significant Deficiency Reporting
- 10 CFR 50 Appendix B Quality Assurance Criteria (App. B)
- QI-QP - 11.4-5, Rev. 27 & Rev. 28 Inspection of Steel Substrate Primer Repair and Seal and Finish Coat Application and Repair.
- QI-QP - 11.4-28, Rev. 1 Protective Coatings Inspection Travelers
- CP-QP - 16.0, Rev. 12 Nonconformances
- CP-QP - 18.0, Rev. 14 Inspection Report
- CP-QP - 16.1, Rev. 5 Significant Construction Deficiencies
- CP-QP - 17.0, Rev. 3 Corrective Action
- CP-QP - 15.7 Trend Analysis
- Pertinent portions of superseded revisions to selected procedures from licensee's historical procedure files.
- Last three quarterly Trend Analysis reports (Quarters 1, 2, 3, 1983)
- Selected Corrective Action Requests (CARs) along with responses and follow-up documentation.
- Selected Inspection Travelers
- Selected Inspection Reports
- Selected Nonconformance Reports

The licensee's nonconformance control program in general meets the requirements of App. B and is structured in a tiered manner with items of lesser significance being handled at a lower level. As the individual items become more significant, they are handled at a higher level. This tiered scheme allows management to concentrate on the more important matters and is effectively used at other nuclear sites. Items of increasing importance are handled with reports of increasing importance as follows: Travelers or Inspection Reports, NCRs, CARs, and 50.55e reports to the NRC. The licensee's program also generally has provisions for escalating a significant item to a higher level report and for identifying significant trends amidst numerous reports. The Trend Analysis program was detailed and appeared effective.

### 5.3.2 Inspection Reports (IR) and Travelers

Quality Control (QC) inspections are routinely performed using either an inspection report or a traveler form per the procedures listed above. These forms have predetermined attributes to be inspected and judged "SAT" or "UNSAT". In general, and in the coatings area particularly, the licensee's policy is to record unsatisfactory conditions identified during inspections as "UNSAT" conditions on these forms. This policy, per se, is not a problem, as alleged, because the licensee's program has provisions for reviewing, tracking, correcting, reinspecting, trending, and escalating these lower level items. Discussions with licensee management further indicated that the Remarks/Comments sections of these forms can and should be used by inspectors to identify any unsatisfactory conditions in the area being inspected, which are not covered by the predetermined attributes. Management also stated that reinspections are performed by only qualified QC inspectors. The inspector noted that:

- 1) The IR and Traveler procedures did not clearly state that the Remarks/Comments sections could be used for unsatisfactory conditions other than the pre-assigned attributes, and
- 2) The procedures did not clearly state who performed re-inspections for "UNSAT" conditions.

This item is unresolved and is designated Item No. (445/84-0306; 446/84-0106).

### 5.3.3 Nonconformance Reports

CP-QP-16.0, the controlling procedure for NCRs does not restrict who can write an NCR and in fact states that it is the responsibility of all personnel to report nonconformances. The inspector noted that many had been written by a variety of personnel, including coatings QC inspectors. Once written, the procedure details the process for resolution and closure of the NCR. Disposition is by the designated "Action Addressee", and is approved by an Engineering Supervisor for anything other than rework back to the original specified requirements. For rework, where the item is merely returned to original requirements, a Construction Supervisor is the "Action Addressee". In all cases, a QC/QE Supervisor approves the disposition and a QC inspector will reinspect (where pertinent). The inspector noted that Procedures CP-QP-16.1 and 17.0 for Significant Construction Deficiencies (under 50.55e) and CARs mention that NCRs are reviewed to determine whether the NCR should be reported under those procedures. However, the NCR Procedure, CP-QP-16.0, does not state specifically when and by whom, individual NCRs are reviewed to determine if escalation to Procedures 16.1 or 17.0 is appropriate. This item is unresolved and is designated as Item No. (445/84-0307; 446/84-0107).

### 5.3.4 Corrective Action Requests

Procedure CP-QP-17.0 is the controlling procedure for Corrective Action Requests (CARs). These documents are important in that they ensure that preventive action to prevent recurrence of significant nonconformances is established, documented, and accomplished. The inspector noted that this procedure was not well defined in that:

1. The procedure does not clearly state when the review of individual "UNSAT" IRs and Travelers, NCRs, etc. is performed to see if escalation to a CAR is needed.
2. Paragraph 3.2.2 overly restricts CARs to items requiring immediate attention.
3. The procedure does not clearly describe the process to be followed for individual CARs. As a result, of eleven CARs reviewed: five had no documentation of the acceptability of the response; eight had no documentation of the corrective action verification; and two were not promptly closed.

#### 5.3.4 Corrective Action Requests (Cont'd)

4. CARs were not sent to appropriate levels of management as per App. B. (Viz. at least one level above the action party).

This item is unresolved and is designated as Item No. (445/84-0308; 446/84-0108).

#### 5.4 Allegation Number 16

A discussion was held during the entrance meeting of January 30, 1984 between TUGCO, NRC, and BNL on this allegation. TUGCO stated that improper pressure was not placed on the QC Inspectors and further meetings were to take place between TUGCO and the NRC to resolve this issue. Therefore, BNL will await this further resolution of this issue between NRC and TUGCO before performing onsite inspections.

### 6. Design Basis Testing of Coatings

#### 6.1 Test Data Packages

In order to address a number of the above allegations, the inspectors requested and received packages of data from testing performed according to ANSI N101.2 to verify that coatings will withstand design basis conditions. The inspectors noted that the data packages were not well-organized and did not appear to have been formally reviewed and approved by the licensee. Also, it was not clear, in some of the packages provided, if the results were of acceptable tests or failed tests (e.g., Carboline Test Reports, Nos. 01907 and 01978). The control and review by the licensee of Coatings Test Data Packages in accordance with App. B, Criterion XI, is unresolved and is designated Item No. (445/84-0301; 446/84-0101).

#### 6.2 Coating Film Thicknesses

The Design Basis Test Data of Coatings presented to the inspectors did not, in some cases, appear to envelope the same range of coating film thicknesses as was actually being applied in the plant. For example, one system in use is Carboline 191 primer, as a repair over a power-tooled surface of Carbo-Zinc 11 and Phenoline 305, then followed with a final coat of Phenoline 305. This system was tested at 4.0-4.5 mils Dry Film Thickness (DFT) of Carboline 191, but is being accepted by procedure at an average DFT 2.0-7.0 mils of Carboline 191. The correlation of test DFTs to actual site applied DFTs is unresolved and is designated as Item No. (445/84-0302; 446/84-0102).

## 7. Dry Film Thickness (DFT) Measurement

The inspector reviewed the licensee's method of measuring dry film thickness of applied coatings. Paragraph 9.2.1 of Specification AS-31, "Protective Coatings" states that Standard SSPC-PA2-73T, "Measurement of Dry Paint Thickness with Magnetic Gages" will govern the use, calibration, and accuracy of DFT gages. The licensee has provided DFT acceptance limits in Procedure QI-QP-11.4-26. The inspector questioned the licensee's method of calibration and use of the magnetic Elcometer-111 DFT gages. It appeared that measurement tolerances and methods allowed could compound the film thickness problem described in Paragraph 6.2 above by allowing the span of film thicknesses to be even larger than specified, for example:

1. The licensee had inappropriately specified a +1.0 mil tolerance for both calibration shop and field calibration of the DFT gages (calibration sheets in shop and field memo dated 1/24/84). From a small sample, the inspector noted actual shop calibration data that was off by 0.21 mils and observed an actual field calibration that was off by approximately 0.5 mils.
2. The spot test allowable minimum for Carbo-Zinc 11 in QI-QP-11.4-26 was 1.5 mils vice 1.6 mils per SSPC-PA2.
3. The licensee does not establish calibration corrections per SSPC-PA2.
4. The licensee does not correct readings for surface profile per SSPC-PA2.

The inspector also noted that the National Bureau of Standards calibration shims are accurate to +5%. In the worst case, with the above tolerances at their maximum, it is theoretically possible to get a satisfactory primer thickness reading on bare steel. This item is unresolved and is designated Item No. (445/84-0303; 446/84-0103).

## 8. Coating Specification

The coatings at Comanche Peak are applied in accordance with two specifications as follows:

Westinghouse Scope of Supply - Process Specification PS 597755

Remainder of Plant - Specification No. 2323-AS-31

The inspector's review of the Westinghouse specification has not been completed. The review of AS-31 determined that the specification was last revised 3/15/73 and since that time had over 100 Design Change Authorizations



(DCAs) issued against it, making it difficult to use. Comanche Peak Quality Assurance Plan, Section 6.0 "Document Control" states that appropriate documents are controlled and changes from comments, nonconformances, or engineering work are incorporated into the revised documents. This item is unresolved pending the revision of AS-31 to incorporate the pertinent DCAs and is designated Item No. (445/84-0304; 446/84-0104).

9. Witnessing of Coating Application and Inspection

9.1 Steel

The inspector toured the Reactor Building daily during the inspection and observed work in progress on steel components, including: surface preparation with power tools, cleaning with paint thinner, application primer, QC inspection of primer, application of topcoat, and final QC inspection. With the exception of items noted elsewhere in this report, no discrepancies were identified. The inspector noted that the general quality of both coating application and QC inspection appeared good.

9.2 Concrete - General

The inspector toured the Reactor Building - Unit 1 daily during the inspection and observed work in process on concrete surfaces including cleaning with paint thinner, application of Mutec 11 primer, QC inspection, both prior to and after primer application. With the exception of items noted in Paragraph 9.3 below, no discrepancies were identified. The inspector noted that the general quality of both concrete coating application and QC inspection appeared good.

9.3 Concrete - Coating Systems Overlap

Instruction Number QI-QP-11.4-27, Revision 0, dated December 29, 1983, gives the maximum allowed overlap on page 10, third note, as 1-1/2 inches. The inspector noted that both painters and QC inspectors were not clear on the requirement to limit overlap on concrete coating system repairs to 1-1/2 inches. It was also observed that painters exceeded the 1-1/2 inch limit on overlapping on several occasions. The actual overlap was on the order of from 1-1/2 to several inches.

The inspector stated that, if a 1-1/2 inch overlap was indeed a valid criteria, that more training of personnel was needed in this area. This item is unresolved and is designated as Item No. (445/84-0305; 446/84-0105).

10. Unresolved Items

Areas for which more information is required to determine acceptability are considered unresolved. Unresolved items are contained in Paragraphs 5.14.2, 5.14.3, 5.14.4, 6.1, 6.2, 7.0, 8.0, and 9.3.

11. Management Meetings

On January 30, 1984 and February 3, 1984 meetings were held with plant management to discuss the scope and findings of this inspection. Attendees at the exit meeting on February 3 are indicated in Paragraph 2.

ALLEGATION LISTING

1. Paragraph 4.3.1.2 of Procedure Number CCP-40 states "Imperial coatings may be applied in the following sequential order: #11S/1201/11S/1201 or 11S/1201/11/1201." Imperial letter dated May 8, 1978, VBR-7697 to Mr. Kelley Williams, second paragraph, states: "Although the resultant systems #11S/1201/11S/1201 or #11S/1201/11/1201 have not been qualification tested, there is no reason to believe that they are not viable systems." Thus these two systems have not been DBA qualified.
2. Specific sequencing of coatings for systems are not required. For example, NCR No. C83-01752 dated 6/23/83, Disposition section, first paragraph, states: "Table A2 in Appendix A of AS 31 specifies acceptable coating systems, i.e., primer and final coat product identification and vendors." It then goes on to say that full sequencing is not identified. "This table does not identify full system sequencing or application parameters." Does a system's sequencing change for a repair? Why? Has the repair sequence been DBA qualified?
3. DCA, No. 17, 142, Rev. 2, allows Carboline 305 to be applied over another manufacturer's epoxy coating. Has this system been DBA qualified?
4. DCA, No. 12, 374, Rev. 1, allows inorganic zinc primer (Carboline CZ-11) to be top coated by Imperial 1201. Has this system been DBA qualified?
5. Procedure No. CCP-30A, Rev. 2, page 2 of 13, Paragraph 1.3.1 allows the application of Carboline 305 over the primer Dimetcote 6 by Ameron. Has this system been DBA qualified?
6. Procedure No. CCP-40, Rev. 5, page 5 of 13, Paragraph 4.1.1.3 states: "Repair of embedded foreign objects such as nails, rebar chairs, bolts, wood, or plastic shall be repaired per the following guidelines before application of NUTECH 11S surfacer." Have these systems been DBA qualified?
7. NCR No. C83-10986 discusses the cracking and flaking of concrete coatings systems (NUTECH 11, 11S, 1201). The disposition section of this NCR states "cracking of coatings is due to excessive stresses in the coating during drying and curing." The allegation is that repairing these cracks will not remedy the condition which caused the cracks.
8. Paragraph 4.1.3 of Procedure Number CCP-30, Rev. 11, states: "...shadows or tight residue of primer which may remain in the profile of the previously prepared substrate is acceptable." The allegation questions the integrity of an inorganic zinc primer which has been applied over a steel substrate with metallic zinc residue in the profile of the steel. The concern is that there will be coating adhesion problems, and that the zinc is isolated from the carbon steel substrate; thus the necessary galvanic action will fail to occur.

9. It is alleged that three coats of inorganic zinc primer have been applied at Comanche Peak to obtain the required dry film thickness. Paragraph 3.2.4 of Instruction Number QI-QP-11.4.5, Rev. 27, states: "Only two (2) overcoats shall be applied." It is alleged that this system would lack chemical attraction or intercoat adhesion with itself. Is this three coat primer system qualified, for example for environmental (irradiation) conditions and DBA conditions, under ANSI N101.2-1972?
10. Paragraph 3.2.2.3 of Instruction Number QI-QP-11.4-5, Rev. 27, page 8 of 27, states: "Surfaces that have been power tooled with '3M Clean-It-Strip,' 30 grit or coarser 'flapper wheels,' sanding discs, 'roto peans,' or equivalent to provide acceptable surface profile. It has been alleged that:
  - a. The coating system applied to surfaces prepared using the above specified power tool methods are not qualified, for example for environmental (irradiation) conditions and DBA conditions under ANSI N101.2-1972.
  - b. The above-mentioned methods provide a smoothing or polishing action, rather than a penetrating action as obtained with sandblasting or with a needle gun.
  - c. The profile that is obtained using the above-mentioned methods occurs in a sparse pattern and not a densely packed pattern.
11. It is alleged that DCA No. 18, 489, Rev. 1, allows a primer thickness of 0.5 mils. If this is so, is a coating system having a primer coat of 0.5 mil thickness qualified, for example for environmental (irradiation) conditions and DBA conditions under ANSI 101.2-1972?
12. If maximum limits are used, Paragraph 4.3.1.2 of Procedure Number CCP-40, Rev. 5, allows a 102 mil thick coating system for 11S/1201/ 11S/1201. Is this system thickness qualified, for example for environmental (irradiation) conditions and DBA conditions, under ANSI 101.2-1972?
13. It is alleged that the coatings applied to areas such as the reactor core cavity will not maintain their integrity due to neutron and gamma exposure. It is further alleged that water and flaked-off paint will flow out of the reactor core cavity in the case of a LOCA. Are the coating systems applied to these areas qualified under ANSI 101.2-1972, especially for environmental and DBA conditions? Which areas are qualified and which areas are not? If coatings in the cavity will come off with irradiation, will this cause a problem post-LOCA?