

TEXAS UTILITIES GENERATING COMPANY
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July 20, 1984

Director of Nuclear Reactor Regulation
Attention: Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION
DOCKET NOS. 50-445 AND 50-446
ENVIRONMENTAL QUALIFICATION OF SAFETY-RELATED
MECHANICAL EQUIPMENT IN POTENTIALLY HARSH
ENVIRONMENTS

REF: (1) B. J. Youngblood letter of 12-16-83
(2) TXX-4105 of 2-7-84
(3) J. J. Stefano memorandum of 5-29-84

Dear Mr. Youngblood:

By a letter dated December 16, 1983, your staff requested that Texas Utilities (TU) perform a new study of the environmental qualification of the safety-related mechanical equipment in a potentially harsh environment at the Comanche Peak Steam Electric Station (CPSES). In reference (2), Texas Utilities requested a meeting to discuss this backfit with the NRC staff. The meeting was held on April 26, 1984, and is documented by a summary report, reference (3).

At this meeting, TU learned that this backfit is a requirement. The NRC Staff did allow that the study did not have to be complete until prior to power ascension (prior to exceeding 5% power). The NRC staff did require, however, that TU provide a commitment to perform the required study. This commitment would allow the NRC Staff to write a favorable SER for the CPSES Operating License. It is the purpose of this letter to submit that commitment.

TU will perform and complete a study of the environmental qualification of safety related mechanical equipment in a potentially harsh environment at CPSES. This study is in progress and is scheduled to be completed prior to power ascension above 5% power. A description of the program, which is based on the discussions held April 26, 1984, is attached (Attachment 1 for BOP and Attachment 2 for NSSS). Prior to power ascension, TU will submit the results of the study including (1) corrective actions identified and (2) a justification for interim operation for any safety related mechanical equipment in a potentially harsh environment whose environmental qualification has not been adequately established.

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It is the intent of TU that this commitment and the study (as described in the attached summaries), meet the NRC Staff requirements as stated in its December 16, 1983, letter and as discussed in the meeting of April 26, 1984. If there are any comments or questions, please let the TU Nuclear Licensing staff know as soon as reasonably possible.

Respectfully,



H. C. Schmidt

HCS:grr
Attachments

Distribution: Original + 40 copies

ATTACHMENT 1 TO TXX-4233

SUMMARY DESCRIPTION OF
BOP MECHANICAL EQUIPMENT QUALIFICATION PROGRAM

1.0 PURPOSE

To satisfy the requirement of the NRC staff that a study be performed to provide additional documentation to show that mechanical equipment at CPSES is adequately environmentally qualified (i.e., to show with adequate assurance that the mechanical equipment at CPSES will not suffer a common mode failure due to the environmental effects of a design basis accident that could jeopardize plant safety or the health and safety of the general public).

2.0 SCOPE

Safety-related Balance of Plant (BOP) mechanical equipment which must perform an active safety-related function following a design basis accident and which is located in a potentially harsh environment due to that accident. Also included are containment and reactor coolant pressure boundary valves.

3.0 DEFINITIONS

Design basis accident = LOCA, Steam Line Break, Feed Line Break, HELB outside containment

Safety-related BOP mechanical equipment = Safety Class 1, 2, or 3 equipment as defined by the CPSES design and as described in the CPSES FSAR, excluding equipment purchased under the CP-0001 (NSSS) specification.

Active function = a function that requires the equipment to actuate or operate; that is, perform mechanical movement

Potentially harsh environment = an environment which is significantly more severe than the environment that would occur during normal plant operation, including anticipated operational occurrences (based on the definition of mild environment in 10 CFR 50.49). Equipment will be considered to be in a potentially harsh environment if the accident could cause the equipment to experience:

- a. Direct water or chemical spray,
- b. A rapid atmospheric pressure increase of 2 psi or more,
- c. A rapid temperature increase to a temperature 5^oC or more above the maximum normal ambient including anticipated operational occurrences (or a peak above 130^oF), or
- d. A total integrated radiation exposure dose of 1×10^4 rads or more

If radiation is the only harsh environment criteria exceeded for a particular room, then the equipment in that room is evaluated only for radiation effects.

Mechanical equipment is highly resistive to degradation due to elevated humidity levels; therefore, relative humidity will not be included as a parameter to be evaluated for environmental qualification.

4.0 QUALIFICATION METHODOLOGY

The environmental qualification review of BOP mechanical equipment will consist of the following steps:

- a. Identification of mechanical equipment requiring evaluation
- b. Identification of equipment location

- c. Identification of nonmetallics for equipment
- d. Identification of maximum postulated environmental conditions for the equipment locations
- e. Identification of environmental effects on material properties
- f. Thermal aging analysis for plastics and elastomers
- g. Evaluation of environmental effects on equipment function

The results of this evaluation will be documented in a separate data package for each specification.

4.1 Identification of Mechanical Equipment Requiring Evaluation

The initial step in determining the mechanical equipment required to be evaluated consists of a review of specifications issued as of May 1, 1984.

The following categories of specifications are eliminated from the scope of mechanical equipment qualification:

- a. Specifications which are not safety-related
- b. Specifications which procure only electrical equipment
- c. Specifications which procure only passive or structural equipment
- d. Specifications which procure only equipment located in a non-harsh environment.

By elimination of specifications using this criteria, the list of specifications containing equipment within the scope of this procedure

will be determined. The equipment procured under each applicable specification will be identified in each package.

The following examples of categorization of equipment results from application of the above criteria:

<u>ACTIVE</u>	<u>PASSIVE</u>
Pumps	Piping/pipe supports
Valves (which may be required to operate)	Fire stops and seals
Fans	Venturies/orifices
Dampers	Cable trays & conduit
Check valves	Vent, drain and instrument root valves
Safety & relief valves	Terminal or junction boxes
HVAC compressors	Vessels, tanks, heat exchangers
Hydraulic snubbers	Expansion joints
Containment hatches	Strainers/filters
Reactor coolant and containment pressure boundary valves (pressure boundary materials only)	Spool pieces/flanges

4.2 Identification of Equipment Location

The location of equipment requiring evaluation will be determined and identified in each package.

4.3 Identification of Nonmetallic Subcomponents

The latest revision of the manufacturer's bills of materials, vendor manuals, and vendor drawings for the equipment to be evaluated will be reviewed. Where necessary, additional information will be obtained from the equipment vendor to explain trade names, for identification

of specific trade name materials, or to clarify incomplete/unsatisfactory material identification. All nonmetallic subcomponents will be identified and tabulated in each package, along with their material composition.

4.4 Identification of the Maximum Postulated Environmental Conditions for the Equipment Locations

The environmental conditions to be used for the review of mechanical equipment are those based on the Interim Staff Position on Environmental Qualification of Safety Related Equipment, NUREG-0588, and radiation source terms based on post-TMI values. These environmental conditions reflect the worst-case conditions to which equipment must be qualified. Where accident or normal process conditions exceed environmental conditions, they will be used as the basis for evaluation.

4.5 Identification of Environmental Effects on Material Properties

The consideration of pressure, flood level, and chemical spray will be evaluated generically to determine the potential impact on mechanical equipment. These parameters will be addressed in each data package relative to the specific equipment.

Each nonmetallic will be examined to determine the effect of the environmental conditions on the material properties. For each nonmetallic, the radiation threshold level and maximum service temperature will be obtained. The radiation threshold level is the lowest radiation exposure at which property change in the material is documented. The maximum service temperature is the maximum steady state temperature to which a material can be subjected without loss of function. The radiation threshold level and maximum service temperature data may be obtained from the following: materials handbooks, textbooks, government reports, laboratory data and industry

sources. If evaluation indicates that the lowest levels may be exceeded for certain equipment, higher levels may be identified at which varying degrees of material degradation may occur.

4.6 Thermal Aging Analysis of Plastics and Elastomers

Material aging analysis will be completed for all plastics and elastomers. Mineral-based subcomponents are not considered to be sensitive to thermal aging during the design life of the plant and, therefore, will not be analyzed. If the service life based on thermal aging is shorter than the planned maintenance interval, further evaluation will be required.

4.7 Evaluation of Environmental Effects on Equipment Function

A conservative initial screening of the nonmetallic subcomponents will be made by comparison of the material capabilities (threshold radiation level and maximum service temperature) with the maximum postulated environmental conditions. If the threshold radiation values and the maximum service temperatures are above the maximum postulated environmental conditions and if the material aging analysis demonstrates a service life sufficient to survive the accident duration, then the material will be considered acceptable.

Those items which are not shown to be acceptable based on the comparison will be evaluated in further detail regarding:

- a. degree of material degradation
- b. material properties affected
- c. equipment/subcomponent function
- d. degree of equipment functional degradation
- e. location specific environmental conditions

If the subcomponent can be shown to be acceptable by evaluation, this evaluation will be documented in the package.

If the subcomponent cannot be shown to be acceptable by evaluation, then the equipment's ability to perform its intended safety function with respect to the subcomponent failure will be evaluated and documented.

4.8 Acceptance Criteria

In order to be considered acceptable, the nonmetallic subcomponents of the mechanical equipment must:

- a. be shown to be acceptable for the plant environment by exhibiting threshold radiation values above the postulated environmental condition, and
- b. be shown to be acceptable for the plant environment by exhibiting a maximum service temperature above the maximum postulated environmental condition, and
- c. be shown to exhibit a service life sufficient to survive the accident duration, or
- d. be shown to be acceptable for the plant environment by analysis that demonstrates that the safety function of the component is not compromised.

The mechanical equipment shall be considered qualified if all subcomponents can be shown to be acceptable. If any subcomponent cannot be shown to be acceptable by either comparison or evaluation for the postulated plant environment, then the equipment will be identified as requiring further evaluation.

5.0 SCHEDULE

The initial environmental qualification review of BOP mechanical equipment is currently planned to be completed by fuel load. Items

identified as requiring further evaluation based on this initial review will be resolved or a justification for interim operation (JIO) will be provided prior to exceeding 5% power.

ATTACHMENT 2 TO TXX-4233

SUMMARY DESCRIPTION OF
NSSS MECHANICAL EQUIPMENT QUALIFICATION PROGRAM

1.0 SCOPE

W will provide an evaluation of the environmental qualification for safety related mechanical equipment as defined. The evaluation will include a final report which will encompass all equipment evaluated.

2.0 EQUIPMENT DESCRIPTION

The equipment to be evaluated is limited to the equipment supplied by W on the base NSSS contract and is defined as all Class 1, 2, and 3 mechanical equipment which must perform an active safety-related function following a design basis accident and is located in a potentially harsh environment due to that accident, and as valves which form part of the Reactor Coolant Pressure Boundary or the Containment Pressure Boundary.

3.0 EVALUATION DESCRIPTION

A technical evaluation of each mechanical component as defined above will be performed. This evaluation will include:

- 3.1 Each component will be reviewed and the associated nonmetallic parts identified. The review will be performed using the current drawings and specifications on file at W as of March 14, 1984.
- 3.2 Each nonmetallic part will then be evaluated as to the part's criticality to the overall component function. Critical parts shall be defined as those parts whose integrity must be

maintained under the specified environmental conditions for the equipment to satisfactorily perform its intended safety function.

- 3.3 The critical parts will then be evaluated based on material capabilities, which will be identified, versus the plant specific postulated environments for each component.

4.0 REPORT DESCRIPTION

The report will include:

- a.1 A listing of all components reviewed.
- a.2 A listing of the environments specified in the applicable W equipment specification.
- a.3 A list of equipment drawing numbers and revisions, purchase order number and applicable E-spec numbers and revisions.
- b. A listing of nonmetallic noncritical parts, and materials.
- c. A technical evaluation of all critical part material capabilities.
- d. An evaluation of the material capabilities versus the plant specific environments.
- e. A list of references.

5.0 PROPRIETARY DATA

It may be necessary in the course of this evaluation to make reference to data which has been generated through W full sequence qualification

testing. This data has been reviewed by the NRC and is proprietary to W. The reports will be on file at W for audit purposes.

6.0 REVIEW BY TUGCO

Prior to final issue of the qualification report, TUGCO will review the report for technical content and to assess the report against the planned maintenance and surveillance schedules.

7.0 SCHEDULE

The schedule for completion of the work is October 1984.