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February 13, 1998

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& Principal Nuclear Officer

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NOS. 50-445 AND 50-446
TRANSMITTAL OF RISK-INFORMED INSERVICE TESTING INFORMATION
REQUESTED BY NRC

REF: 1) TU Electric Letter logged TXX-96371, from C. L. Terry to the NRC, dated June 3, 1996.
2) TU Electric Letter logged TXX-97272, from C. L. Terry to the NRC, dated December 18, 1997.

Gentlemen:

At a public meeting on December 8, 1997, and during followup phone conversations with the NRC, the NRC requested that TU Electric submit a draft revision of Enclosure 2 of Reference 1. TU Electric submitted a draft revision on December 18, 1997, via Reference 2. As a result of phone conversations with the NRC staff on January 14, 1998, TU Electric agreed to submit a second draft revision of Enclosure 2 of Reference 1. TU Electric has developed the second draft "Risk-Informed Inservice Testing Program Description," dated February 13, 1998 (Enclosure). TU Electric will re-submit this document after final resolution of comments.

This communication contains commitments regarding CPSES Units 1 and 2 as identified in the Attachment.

If you have any questions, please call Carl Corbin at (254) 897-0121.

Sincerely

C. L. Terry

C. L. Terry

By: Roger D. Walker
Roger D. Walker
Regulatory Affairs Manager

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CBC/cc
Attachment
Enclosure
c - E. W. Merschoff, Region IV
J. I. Tapia, Region IV
T. J. Polich, NRR
Resident Inspectors, CPSES

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Attachment

This communication contains the following commitment which will be completed as noted:

ACL Number	Commitment
97-147	TU Electric will re-submit the Risk-Informed Inservice Testing Program Description after final resolution of comments.

The ACL (Action Correspondence Log) number is used by TU Electric for the internal tracking of CPSES commitments which are one time action requirements.

This communication contains the following potential commitment which is ongoing in nature and will be incorporated into the CPSES licensing basis in the next appropriate update to Inservice Testing Plan (IST):

CDF Number	Commitment
26998	If a risk informed Inservice Testing (IST) program is implemented, it will be maintained in accordance with an NRC approved "Risk-Informed Inservice Testing Program Description". This program will be described in a relief request to the IST Plan.

The CDF (Commitment Data Form) number is used by TU Electric for internal tracking of CPSES commitments.

RISK-INFORMED INSERVICE TESTING PROGRAM DESCRIPTION (RI-IST)

The proposed alternative is a risk informed process to determine the safety significance and testing strategy of components in the ASME Section XI Inservice Testing (IST) Program, and identify non-ASME IST components (pumps & valves) modeled in the Individual Plant Examination (IPE) that are determined to be High Safety Significant Components (HSSCs). The process consists of the following elements.

1) Utilization of the Probabilistic Risk Analysis (PRA) techniques to identify component importance measure values. (PRA Techniques)

2) Categorize components based on importance measures determined by the PRA techniques. (Component Risk Category)

3) Blended deterministic and probabilistic data to perform a final importance ranking of components and categorization as either Low Safety Significant Component (LSSC) or High Safety Significant Component (HSSC). (Integrated Decision Process) (IDP)

4) Develop/Determine Test Frequencies and Test Methodologies for the IST components. (Testing Philosophy)

5) Evaluate the cumulative impact of the test frequency changes on total plant risk (i.e., CDF and LERF) to ensure that the change in plant safety is within the acceptable range. (Cumulative impact)

6) Develop an implementation plan. (Implementation)

7) Develop a Corrective Action plan. (Corrective Action)

8) Perform periodic reassessments. (Periodic Reassessments)

9) Develop a methodology for making changes to the RI-IST. (Changes to RI-IST)

1) <u>PRA Techniques</u>

PRA methods will be used to determine the risk significance of components based on end states of interest, such as core damage frequency (CDF) and release of radioactivity (e.g. large early release frequency (LERF)).

The PRA techniques are used in conjunction with the Integrated Decision Process (IDP) to ensure that all the available information is accounted for in developing the importance measures. As such, a review of plant equipment and operating procedures will be performed to identify potential plant specific initiating events as well as those initiating events that have been identified in the Nuclear industry. Evaluation of initiating events will also include loss of support systems and other special initiators.

Any changes to the PRA models used for the development of importance measures for the RI-IST will be independently reviewed. The independent reviews will be by either the in-house personnel or outside consultants.

The PRA will be periodically evaluated (See Section 8) to reflect the current plant design, procedures, and programs. Also the PRA will be evaluated prior to moving components to the LSSC category.

A full scope PRA is not required. However, any limitations (e.g. missing initiating events) will be addressed by the IDP using the methodology described in Section 2 below.

The potential degradation of components will be considered in the overall assessment of risk associated with the implementation of the RI-IST. As a result, any effect on common cause failure estimations will also be evaluated. To the extent possible, plant-specific data will be utilized to assess component degradation.

Compensatory measures which are used as part of the IDP process to qualitatively justify the extension of test interval will be re-verified during the IDP process update (See Section 8).

2) Component Risk Category

Two figures of merit will be used to initially determine the risk categories of IST components. These two methods are Fussell-Vesely (FV) and Risk Achievement Worth (RAW). For the RI-IST Program, the following criteria will be used to initially rank components for review by the Integrated Decision Process (IDP).

Category	Criterion
High	FV > 0.001
Potentially High	FV < 0.001 and RAW > 2
Low	FV < 0.001 and RAW < 2

The ΔCDF and ΔLERF for the change are within the acceptance guidelines of Regulatory Guide 1.174.

Methodology/Decision Criteria for Limited Scope PRA

The following describes a methodology that may be used to categorize components in the RI-IST when the program is reassessed. However, only those elements that are significantly affected by the model changes (e.g., design modifications or procedural changes) need to be reviewed in detail using this process. The scope of the review and the justification for it will be documented as part of the IDP.

Apply Importance Criteria to PRA and Review

Review FV and RAW importance measures for pumps and valves considered in the PRA against the criteria and determine if the grouping of components is logical.

Review component importance measures to make sure that their bases are well understood.

Robustness/Validation of Results

- Address the sensitivity of the results to common cause failures (CCF), assuming all/none of the CCF importance is assigned to the associated component.
- Evaluate the sensitivity due to human action modeling. Identify/evaluate operator actions omitted by the IPE that can change the ranking of a component. The omitted recovery actions are those not credited because they are not important to the CDF.
- Consider industry history for particular IST components. Review such sources as NRC Generic Letters, SOERs, IOERs and Technical Bulletins and rank accordingly.
- For components with low FV/high RAW ensure that other compensatory measures are available to maintain the reliability of the component.
- Identify and evaluate components whose performance shows a history of causing entry into LCO conditions. To ensure that safety margins are maintained, consider retaining the ASME test frequency for these components.
- Ensure that truncated components have been eliminated due to redundancy of function rather than solely due to reliability. If they are truncated due to their high reliability, then those components should be qualitatively re-evaluated and re-categorized appropriately.

Validate or change the PRA-based component ranking. If the validated PRA ranking is high, rank the component high; if the PRA ranking is low and the other factors such as the operating performance of the component validate the ranking, rank as low.

Fire, Tornado and Seismic Considerations

Consider the following for risk ranking components for external events.

- Calculate risk importance measures for components in the fire and tornado cutsets. Compare these calculated values and the PRA values to identify those components that are less risk significant for the IPE but more risk significant for fire and tornado.
- Review component importance measures and the PRA limitations for fire and tornado in a manner similar to that described for internal events discussed above and adjust the rankings of the components accordingly.

- For those components on the Safe Shutdown Equipment List (SSEL) and the containment systems list, review their risk categories to ensure that those components important to seismic and containment integrity are appropriately categorized.

Outage Criteria

Consider the following for risk ranking of components for outage modes:

- If a component performs the same function and is in the same initial state as at power, the at-power ranking usually bounds the outage ranking. If not, the risk category of the component for the outage mode will be evaluated using a qualitative set of rules.

- If a component performs a different function or is in a different initial state than at power, then the outage ranking must be evaluated. This is done using a qualitative approach where components are ranked into three categories based on a qualitative set of rules. The risk categories are defined as follows:

  1. Category 1: High safety significant components (High FV)
  2. Category 2: Potentially high safety significant component (low FV, moderate to high RAW)
  3. Category 3: Low safety significant components (low FV, low RAW)

Back-end Importance

Consider components/systems that are potential contributors to large, early release. There are essentially four groups of potential contributors to large, early releases:

- containment cooling systems
- containment isolation valves
- high to low pressure interfacing valves (i.e., interfacing systems LOCA)
- ECCS systems uniquely important to preventing high pressure core damage scenarios

Determine FV LERF for components and/or determine which would have the equivalent of a high FV with respect to LERF and rank accordingly.

IST Components Not in PRA

Review components not explicitly modeled in the PRA to ensure an IST component is, in fact, low risk.

High-Risk PRA Components Not in the IST Program

Identify other high risk pumps and valves that are not in the IST program but should be tested commensurate with their risk importance.

- Evaluate the PRA modeling assumptions, component failure modes, operator actions, recoveries and any other effects that could substantiate the components risk category as "high risk" even if they are not in the IST Program.
- Determine whether current plant testing is commensurate with the importance of these valves. If not, determine what test, e.g., the IST test, would be the most appropriate.

Other Considerations

Perform sensitivity studies, as needed, to evaluate the cumulative impact of changes in the IST Program test strategies on the total CDF.

3) Integrated Decision Process

The purpose of utilizing the Integrated Decision Process (IDP) is to confirm or adjust the initial risk ranking developed from the PRA results, and to provide qualitative assessment based on engineering judgement and experience. This qualitative assessment compensates for limitations of the PRA, including cases where adequate quantitative data is not available.

The IDP utilizes deterministic insights, engineering judgement, experience and regulatory requirements as described above in Section 2. The IDP will review the initial PRA risk ranking, evaluate applicable deterministic information, and determine the final safety significance categories. The IDP considerations will be documented for each individual component to allow for future repeatability and scrutiny of the categorization process.

The scope of the IDP includes both categorization and application. The IDP is to provide deterministic insights that might influence categorization. The IDP will identify components whose performance justifies a higher categorization.

The IDP will determine appropriate changes to testing strategies. The IDP will identify compensatory measures for potentially high components or justify the final categorization. The IDP will also concur on the test interval for components categorized as low.

The end product of the IDP will be components categorized as Low Safety Significant Component (LSSC) or High Safety Significant Component (HSSC).

In making these determinations, the IDP will ensure that key safety principles, namely defense-in-depth and safety margins, are maintained and that the changes in risk for both CDF and LERF are acceptable per the guidelines discussed in Section 2 above. The key safety principles are described below.

Defense in Depth

To ensure that defense-in-depth is maintained by the CPSES RI-IST program, adherence to four basic principles will be reviewed and documented as part of the IDP for any future changes to the program. The following describes these four basic principles:

1. No changes to the plant design or operation's procedures will be made as part of the RI-IST program which either significantly reduce defense-in-depth or place strong reliance on any particular plant feature, human action, or programmatic activity.

2. The results and dominant contributors to core damage risk will be reviewed to ensure that the categorization of components using PRA is done on an evenhanded basis covering the full scope of safety functions. A review will be done to ensure that components which mitigate the spectrum of accidents are not ranked low solely because of initiating event frequency. Further, sensitivity studies will be performed for human actions to ensure that components which mitigate the spectrum of accidents are not ranked low solely because of the reliability of a human action.

3. The methodology for component categorization, namely the selection of importance measures and how they are applied and understanding the basic reasons why components are categorized HSSC or LSSC, will be reviewed to ensure that redundancy and diversity are preserved as the more important principles. If a component is categorized as LSSC solely due to its high reliability, then it must be confirmed that: 1) plant performance has been good and 2) a compensatory measure or feedback mechanism is available to ensure adverse trends in equipment performance can be detected in a timely manner. A review will be done to ensure that relaxation in the RI-IST program occurs only when the level of redundancy or diversity in the plant design or operation supports it. In this regard, all components that have significant contributions to common cause failure will be reviewed to avoid relaxation of requirements on those components with the lowest level of diversity within the system.

4. The use of multiple risk metrics, including core damage frequency (CDF) and large early release frequency (LERF), with additional checks for large but late releases and consequence mitigation, will be done to ensure a reasonable balance between risk reduction methods.

Other Considerations Related To Defense-In-Depth.

When the PRA does not explicitly model a component, function or mode of operation, a qualitative method may be used to classify the component HSSC or LSSC and to determine whether a compensatory measure is required.

Sufficient Safety Margin is Maintained

The IDP will perform reviews to ensure that sufficient safety margin is maintained when compared to the existing IST program. In performing this review, the IDP will consider such things as proposed changes to test intervals and, where appropriate, test methods. The IDP will ensure that the proposed compensatory measures are effective fault finding tasks, where this is required in the program, to assure safety margin is maintained. To enhance the safety margin, the IDP will also review PRA-important components not in the current IST program for potential inclusion in the RI-IST program.

Categorization Guidelines

Modeled Components/Functions

For modeled components/functions with a FV $\geq$0.001 the IDP either confirms the component categorization is HSSC or justification of conservatism in the PRA model will be developed.

For modeled components/functions with a FV <0.001, but a RAW $\geq$2.0, the component will be categorized LSSC provided a compensatory measure exists that ensures operational readiness and the components' performance has been acceptable. If a compensatory measure is not available or the component has a history of performance problems, the component will be ranked HSSC.

For modeled components/functions with a FV <0.001 and a RAW <2.0, the component will be categorized as LSSC provided the components' performance has been acceptable. For those components with performance problems, a compensatory measure will be identified to ensure operational readiness or the component will be categorized as HSSC.

Non-Modeled Components/Functions

For components not modeled or the safety function not modeled in the PRA, the categorization is as follows:

If the sister train is modeled then the component takes that final categorization.

If the component is implicitly modeled, the FV and RAW are estimated and the deliberation is as discussed for modeled components/functions.

If the component is not implicitly modeled, the system ranking associated with the Maintenance Rule will be confirmed. For confirmed system ranking, the component performance history will be reviewed. For acceptable performance history the component will be categorized as LSSC. For poor performance history, a compensatory measure will be identified to ensure operational readiness and the component categorized as LSSC, or if no compensatory measures are available, categorize the component as HSSC.

Documentation

Documentation of the IDP will be available for review at the plant site.

4) Testing Philosophy

Motor Operated Valves (MOVs)

HSSC	Testing will be performed in accordance with Code Case OMN-1 (except the maximum test interval will be 6 years), and NRC Generic Letter 89-10 and 96-05 commitments.
LSSC	Testing will be performed in accordance with Code Case OMN-1 (except the maximum test interval will be 6 years), and NRC Generic Letter 89-10 and 96-05 commitments.

Performance Monitoring (applicable to HSSC and LSSC):

- termination inspection
- stem threads relubed
- actuator gear box grease inspection
- motor current trending
- T-drain inspection
- limit switch gear box grease inspection
- visual inspection of housings
- stem nut staked and secure

Relief Valves

HSSC & LSSC	Testing will be performed in accordance with the Code of Record as defined in 10CFR50.55a.

Performance Monitoring (applicable to HSSC and LSSC):

- test results trended
- new valves tested prior to installation
- valves bench set at ± 1% (where practical) prior to installation

Check Valve Testing Strategy

HSSC	Testing will be performed in accordance with the ASME Code of Record as defined by 10CFR50.55a.
	Certain HSSC check valves will also be tested in accordance with the Check Valve Reliability Program (CVRP). This program was developed in response to INPO SOER 86-03. Testing for the CVRP includes nonintrusive testing (e.g. accoustic monitoring) and where conditions direct, valve disassembly. The enhanced nonintrusive testing provides for condition

monitoring by comparing data from current testing to a known baseline where the valve was operating in a satisfactory manner.

LSSC — Testing will be performed in accordance with the ASME Code of Record as defined by 10CFR50.55a except at a test frequency not to exceed 6 years (with 25% margin).

Certain LSSC check valves will be tested in accordance with the CVRP as necessary.

Performance Monitoring (applicable to HSSC and LSSC):

- acoustic monitoring data is trended

Air Operated Valves (AOVs)

HSSC — Testing will be performed in accordance with the Code of Record as defined by 10CFR50.55a.

LSSC — Testing will be performed in accordance with the Code of Record as defined by 10CFR50.55a except with a test frequency not to exceed 6 years (with 25% margin). Additionally LSSC AOVs will be stroked at least once during the operating cycle.

Performance Monitoring (applicable to HSSC and LSSC):

- diagnostic testing
- elastomer replacement program
- response time testing

Note: Currently certain AOV's are tested using diagnostic equipment. TU Electric is participating in a tailored collaboration project with EPRI to develop an AOV program similar to the MOV Program mandated by GL 39-10 and 96-05. This program will evaluate the valve/operator characteristics/capabilities and the design conditions under which the valve is expected to operate. Once this information is developed the valves will be tested and modified as necessary to meet their safety function.

Pumps

HSSC — Testing will be performed in accordance with the Code of Record as defined by 10CFR50.55a.

LSSC — Testing will be performed in accordance with the Code of Record as defined by 10CFR50.55a except with a test frequency not to exceed 6 years (with 25% margin).

Performance Monitoring (applicable to HSSC and LSSC):

- thermography of the drivers

- lube oil analysis
- alignment checks
- motor current testing
- vibration monitoring

5) <u>Cumulative Impact</u>

Evaluate the cumulative impact of the test frequency changes on total plant risk (i.e., CDF and LERF) to ensure that the change in plant safety is within the acceptable range. This is done by the following methods:

- The PRA models will be updated to reflect the changes to the test frequency of modeled components, and the PRA study will be re-evaluated to quantify the aggregate impact of the changes.

- The cumulative impact of the test frequency changes will be reviewed through the IDP.

6) <u>Implementation</u>

Implementation of the RI-IST to LSSC will consist of grouping components and then staggering the testing of the group over the test frequency.

Grouping:

Components will be grouped based on:

- manufacturer
- model
- service condition
- size

The population of the group will be dependent on:

- total population available
- maintaining current testing schedule

Grouping components in this manner and testing on a staggered basis over the test frequency will reduce the importance of common cause failure modes as components in the same <u>staggering</u> failure mode group are continually being tested. This ensures that the component capability will be maintained over the test interval (i.e., 6 years).

Testing of components within the defined group will be staggered over the test interval, typically 6 years. Testing will be scheduled on regular intervals over the 6 year period to ensure all components in the group are tested at least once during the 6 year test interval and not all components are tested at one time. The staggering allows the trending of components in the group to ensure the test frequency selected is appropriate.

Testing will be scheduled/planned such that there is no more than one cycle between tests of components in a group.

7) Corrective Action

When a component on the extended test interval fails to meet established test criteria, corrective actions will be taken in accordance with the CPSES corrective action program as described below for the RI-IST.

For components not meeting the acceptance criteria, an Operation Notification and Evaluation (ONE) Form will be generated. This document initiates the corrective action process. Also, the initiating event for a ONE Form may be from causes other than an unacceptable IST test. Programs exist that provide timely information to the IST coordinator that the performance of a reliable component has degraded. For example, a common compensatory action for pump discharge check valves would be the IST pump test. Since this test can not be considered satisfactory if the check valve fails to perform its risk significant function, a test failure would be recorded and a ONE Form initiated. The recorded information could then be used to assess whether a significant change in component reliability has occurred such that the component would merit a change in test interval.

The initiating event could be any other indication that the component is in a non-conforming condition. The unsatisfactory condition will be evaluated to:

a) Determine the impact on system operability and take appropriate action.

b) Review the previous test data for the component and all components in the group.

c) Perform a root cause analysis.

d) Determine if this is a generic failure. If it is a generic failure whose implications affect a group of components, initiate corrective action for all components in the affected group.

e) Initiate corrective action for failed IST components.

f) Evaluate the adequacy of the test strategy. If a change is required, review the IST test schedule and change as appropriate.

The results of component testing will be provided to the PRA group for input to PRA model evaluation. (See Section 8)

For an emergent plant modification, any new IST component added will initially be included at the current Code of Record test frequency. Only after evaluation of the component through the RI-IST Program (i.e., PRA model evaluation if applicable and IDP review) will this be considered LSSC.

8) Periodic Reassessment

As a living process, components will be reassessed at a frequency not to exceed every other refueling outage (based on Unit 1 refueling outages) to reflect changes in plant configuration, component performance test results, industry experience, and other inputs to the process. The

RI-IST reassessment will be completed within 9 months of completion of the outage.

Part of this periodic reassessment will be a feedback loop of information to the PRA. This will include information such as components tested since last reassessment, number and type of tests, number of failures, corrective actions taken including generic implication and changed test frequencies. Once the PRA has been reassessed, the information will be brought back to the IDP for deliberation and confirmation of the existing lists of HSSCs and LCCSs or modification of these lists based on the new data. As part of the IDP, confirmatory measures previously utilized to categorize components as LSSC will be validated. Additionally, the maximum test interval will be verified or modified as dictated by the IDP.

9) Changes to RI-IST

Changes to the process described above and to the evaluation of risk impact will require prior NRC approval. Changes to the categorization of components and associated testing strategies using the above process will not require prior NRC approval. As changes to component categorization are made, TU Electric will periodically submit them to the NRC for their information.