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TEXAS UTILITIES GENERATING COMPANY

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May 21, 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
REQUIRED BACKFIT OF SOURCE RANGE NEUTRON
FLUX MONITORS AND REACTOR COOLANT SYSTEM
COLD LEG TEMPERATURE MONITORS INTO
ALTERNATE SHUTDOWN DESIGN

REF: B. J. Youngblood to R. J. Gary letter of
October 17, 1983, entitled "Staff Evaluation
of Alternate Shutdown Instrumentation
Requirements"

Dear Mr. Youngblood:

In the referenced letter, the NRC staff required that source range neutron flux indication (SR) and reactor coolant system cold leg temperature indication (Tc) be backfit into the Comanche Peak Steam Electric Station (CPSES) alternate shutdown design. The backfit for Tc will be completed prior to fuel load and a description of this backfit is provided in Attachment A. The backfit for SR will be completed prior to the end of the first refueling outage and the present design for the SR backfit is described in Attachment B. The interim design to justify operation during the first operating cycle is described in Attachment C.

Respectfully,

J. L. Marshall

H. C. Schmidt for

BRC/grr
Attachments

Distribution: Original + 40 copies

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ATTACHMENT A

Reactor Cold Leg Temperature Indication Backfit Description for Alternate Shutdown at CPSES

Per a requirement of the NRC staff, reactor coolant cold leg temperature indication (Tc) is being added to the alternate shutdown design at Comanche Peak Steam Electric Station (CPSES) prior to initial fuel load.

Tc will be detected by means of strap-on RTD's. These RTD's will be in contact with the reactor coolant cold leg piping. Under the conditions of alternate shutdown, the RTD's are expected to respond quickly to changes in reactor coolant temperature (calculations have shown that the RTD's will see 90% of a 10F° step change in cold leg coolant temperature, at alternate shutdown conditions, in less than one minute). The temperature signals will be brought out to the Hot Shutdown Panel (HSP). Tc for each coolant loop will be recorded on the HSP.

This instrument loop will meet the criteria specified for alternate shutdown at CPSES as described in Section 7.4 of the CPSES FSAR; and more specifically, all of the hardware required for this channel will be properly separated from the fire zones for which alternate shutdown is required to ensure the availability of the channel during alternate shutdown. In addition, all of the hardware installed as part of this backfit will be located and reviewed in accordance with the Transient Fire Hazards Analysis (TFHA) for CPSES, as described in Section 9.5.1 of the CPSES FSAR, to ensure that the fire protection criteria for CPSES is met. This backfit will not generate any new deviations to Appendix R, Section III.G.

This design is a final design, intended to satisfy the requirements of the NRC staff. This backfit and the associated procedural changes will be implemented prior to fuel load.

ATTACHMENT B

Source Range Neutron Flux Indication Backfit Description for Alternate Shutdown at CPSES

Per a requirement of the NRC staff, source range neutron flux indication (SR) will be added to the alternate shutdown design at Comanche Peak Steam Electric Station (CPSES) prior to the completion of the first refueling outage. The present design intentions for this backfit is described below:

Source Range Neutron Flux will be sensed by the existing source range neutron flux detectors. The transfer will be accomplished at a permanently installed source range transfer panel near the Source Range Neutron Flux Pre-Amplifiers. A keylock switch at the pre-amp will be used to remove high voltage from the detectors. Then the cable from the control room to the detector will be disconnected at the plug-in connector at the pre-amplifier. The cable from the Alternate Shutdown Source Range electronics will then be connected to the the detector at the pre-amplifier. Again, a plug-in connector is used and the cable with the required plug is permanently located at the source range transfer panel. Now the Alternate Shutdown Source Range Cabinet will be energized. Source Range neutron flux will be indicated on a meter on the HSP. The procedure for implementing alternate shutdown will include the transfer of a source range channel to the HSP.

This instrument loop will meet the criteria specified for alternate shutdown at CPSES as described in Section 7.4 of the CPSES FSAR; and more specifically, all of the hardware required for this channel will be properly separated from the fire zones for which alternate shutdown is required to ensure the availability of the channel during alternate shutdown. In addition, all of the hardware installed as part of this backfit will be located and reviewed in accordance with the Transient Fire Hazards Analysis (TFHA) for CPSES, as described in Section 9.5.1 of the CPSES FSAR, to ensure that the fire protection criteria for CPSES is met. This backfit is not expected to generate any new deviations to Appendix R, Section III.G.

The NRC staff has added the additional requirement that a Source Range Neutron Flux channel be available for any design basis fire at CPSES. Both Source Range Neutron Flux channels, including the hardware being added for this alternate shutdown fix, will be reviewed to ensure that the required fire separation is maintained between these two channels in all areas of the plant other than the Cable Spreading Room and the Control Room. For a fire in the Cable Spreading Room or Control Room, the Alternate Shutdown systems are employed. This review will ensure that at least one Source Range Neutron Flux channel is protected for any design basis fire at CPSES.

The intent of the final design will be to satisfy the requirements of the NRC staff. This backfit and the associated procedural changes will be implemented prior to completion of the first refueling outage.

ATTACHMENT C

Interim Design to Control Reactivity During Alternate Shutdown at CPSES

The present Comanche Peak Steam Electric Station (CPSES) design provides direct reading of the process variables necessary to perform reactivity control functions needed for alternate shutdown. This design (as described below) functions as the interim measures to allow for the operation of CPSES during the first cycle.

Proper reactivity control to achieve and maintain cold shutdown reactivity conditions is one of the primary functions necessary for safe shutdown. This function has been addressed by CPSES for normal, accident and alternate shutdown.

For alternate shutdown, reactivity control is established by controlling two variables - control rod position and RCS boron concentration. Rod position is established by reactor trip. The reactor is tripped and shutdown is verified prior to evacuation of the Control Room. If this is not possible, the reactor will be tripped and/or verified as tripped at the Reactor Trip Switchgear. The switchgear will be opened or verified open and current can be verified to be zero at the local ammeters.

At the time of reactor trip, boron concentration is adequate to maintain the required shutdown margin. Boron concentration does not become a concern again unless boron dilution occurs or rapid reactor cooldown occurs. The possibility of a boron dilution accident has been eliminated by isolating all makeup paths except "emergency boration" from the Boric Acid Storage Tanks (or emergency makeup from the borated Refueling Water Storage Tank). Following stablization of the plant at the Hot Shutdown Panel and prior to commencing a cooldown, the operator is instructed by procedure to calculate a cold shutdown margin boron concentration and borate the plant to that condition. To perform this, the operator requests that Chemistry Technicians start sampling the RCS at 10 to 20 minute intervals until the average of three consecutive samples does not deviate by ± 6 ppm from any of the three samples. The operator then uses this value to calculate a boron concentration and the amount of boric acid required to insure an adequate shutdown margin. The plant is then borated and Chemistry Technicians are requested to sample the RCS as previously described to verify the plant is at the required concentration. Following this verification plant cooldown can be started. Chemistry Technicians continue to sample for boron concentration at the 10 to 20 minute interval to ensure adequate shutdown margin is maintained. Since the Boric Acid Storage Tanks and Refueling Water Storage Tank are the only sources of charging water, the boric acid concentration of the Reactor Coolant System will be further increased by the makeup required to account for shrinkage during cooldown.

In summary, direct readings of the process variables (rod position and boron concentration) necessary to perform and control the reactivity control function are obtained from the reactor trip switchgear and from RCS sampling for boron concentration. These direct readings are adequate to assure that the reactivity control function is being performed for CPSES. In addition, RCS boron concentration is followed by knowing the initial boron concentration and by monitoring makeup and letdown flow.

The CPSES procedures that relate to Alternate Shutdown include:

- ABN-905A Loss of Control Room Habitability
- IPO-008A Plant Shutdown for Hot Standby to Cold Shutdown Outside the Control Room

When the transfer of control from the Control Room to the HSP is required, these procedures require immediate actions, such as:

- Trip the reactor
- Proceed immediately to HSP and Shutdown Transfer Panel (STP)
- Locally verify the immediate actions for reactor trip
  Verify reactor trip, reactor trip breakers open

Verify turbine trip, stop valves closed
Verify emergency AC buses energized
Check if Safety Injection initiated

Communications are established between operational personnel at the HSP, STP, and other locations in the plant. Hot Standby is maintained through actions, such as:

- Establishing & maintaining S/G water level and pressure by:
  - Operation of the Auxiliary Feedwater Pumps
  - Controlling of auxiliary feedwater flow to maintain S/G level at 86% wide range
  - Local operations to obtain control of S/G PORV's at HSP
  - Maintaining S/G pressure at 1092 psig

- Establishing and maintaining pressurizer pressure and level by:
  - Operation of station service water
  - Operation of component cooling water
  - Operation of centrifugal charging pump
  - Controlling pressurizer level at 25%
  - Controlling pressurizer heaters to maintain 2235 psig

- Isolating sources of unborated makeup water by:
  - Closing two manual valves and checking a third manual valve closed to isolate all sources of reactor makeup except the Boric Acid Storage Tanks and Refueling Water Storage Tank

- Borating to at least cold shutdown concentration by:
  - Using existing lineup from Refueling Water Storage Tank or
  - Operation of the Boric Acid Transfer Pump and Emergency Boration Valve (for use of Boric Acid Storage Tanks)
  - Opening the Emergency Boration Valve
  - Monitoring the amount of boric acid charged into the RCS
  - Obtaining primary plant samples approximately every 30 minutes until the cold shutdown boron concentration is obtained

- If all Reactor Coolant Pumps are lost, verifying and controlling natural circulation by:
  - Verifying that the differences between Reactor Coolant System (RCS) hot leg (Th) and cold leg (Tc) temperature is less than 120% of full power delta T and is slowly decreasing.
  - Verifying that Th is lower than the saturation temperature for the pressurizer pressure and that this subcooling is slowly increasing.
  - Verifying that Th is slowly decreasing as the generation of decay heat falls off.
  - Trending the parameters above (Th and Tc are displayed on a recorder to assist in this trending).

These procedures continue on to allow cooldown, transfer to RHR and establishment of cold shutdown.

In conclusion the CPSES Alternate Shutdown design provides adequate process variable indication to achieve and maintain a safe shutdown condition and cold shutdown.

In addition, even though Appendix R to 10 CFR part 50 does not apply to CPSES, the Alternate Shutdown design of CPSES does provide direct readings of the process variables necessary to perform and control the reactivity control functions required for alternate shutdown.

Based on the design and pressure descriptions above, operation of CPSES during the first cycle has been adequately justified.

The NRC staff has added the additional requirement that a Source Range Neutron Flux channel be available for any design basis fire at CPSES. Both will be reviewed to ensure that the required fire separation is maintained between these two channels in all areas of the plant other than the Cable Spreading Room and the Control Room. For a fire in the Cable Spreading Room or Control Room, the Alternate Shutdown systems are employed. This review will ensure that at least one Source Range Neutron Flux channel is protected.