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TEXAS UTILITIES GENERATING COMPANY
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June 29, 1984

Director of Nuclear Reactor Regulation
Attention: Mr. B. J. Youngblood
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
EQUIPMENT SEISMIC AND DYNAMIC QUALIFICATION
JUSTIFICATIONS FOR INTERIM OPERATION

Dear Sir:

The seismic and dynamic qualification program for equipment at CPSES will be completed by fuel load except for the qualification packages noted in Attachment (1).

For each of these qualification packages, a justification for interim operation (JIO) is also attached. These JIO's provide the analysis required to show that CPSES can be safely operated until the equipment qualification programs for these packages are completed.

Respectfully,

D R Woodlan for

H. C. Schmidt

DRW/grr
Attachments
Original + 40 copies

A045
1/1

ATTACHMENT (1) TO TXX-4208

Package Number	Equipment
MS-7	Turbine Driven Auxiliary Feedwater Pump Controls
MS-611B	BOP Analog Control System (7300 Series)
ESE-13	7300 Series Process Protection System
ESE-40	Differential Pressure Indicating Switches for Control of RHR Mini-Flow
ESE-47	NIS Cabinet, Source Range Detector and Source Range Pre-amplifier as used for Boron Dilution Event Detection and Mitigation

ATTACHMENT (2) TO TXX-4208
JUSTIFICATION FOR INTERIM OPERATION

QUALIFICATION PACKAGE: MS-7

EQUIPMENT: Turbine Driven Auxiliary F.W. Pump Drive Control Panel and Accessories CP1-AFAPTD-01

SUPPLIER/ MANUFACTURER: Ingersoll-Rand Company

SPECIFICATION/ PURCHASE ORDER: 2323-MS-7/P.O. CP-007

SCHEDULED COMPLETION AND CERTIFICATION: November 30, 1984

FUNCTION/APPLICATION:

The Turbine Driven Auxiliary Feedwater Pump Control Panel is part of an ANS Safety Class 3 system. The turbine speed is controlled by a PGA governor (mechanical hydraulic) which is electrically independent of the control panel. The control panel itself is not safety class, and does not perform a safety function.

The control panel is Seismic Category I for failure of the panel (specifically the "Turbine Trip" pushbutton and circuit) might trip the Turbine Driven Auxiliary Feedwater Pump when it is required to operate. This pushbutton and circuit is associated class 1E. The safety function of the Turbine Driven Auxiliary Feedwater Pump are to supply high pressure feedwater to the secondary side of the steam generator for reactor coolant heat removal following loss of normal feedwater

flow, to provide a cooling source for small break loss of coolant accident, to supply feedwater in the event of a main steamline break, main feedwater break, control room evacuation or steam generator tube rupture.

EQUIPMENT FEATURES:

The Turbine Driven Auxiliary Feedwater Pump Control Panel has several non-safety features including status lights and indication, a local trip and the interface for a remote trip. All equipment for one unit is mounted in a single panel near the pump.

Design Basis Event (DBE) Conditions The seismic levels are specified in a generic RRS that envelopes the CPSES RRS. This equipment is located in a mild environment.

EQUIPMENT QUALIFICATION STATUS

The pushbutton switch has been environmentally qualified for the environment at the panel. However, the seismic qualification of the panel and switch is not yet complete.

A seismic qualification testing program has been developed in order to ensure that, throughout its installed life, the equipment will meet or exceed the requirements of performing safety-related functions under normal and design basis event conditions. The following sequence of tests have been successfully completed to demonstrate the adequacy of the system.

* Pre-test visual inspection
* Baseline functional test
* Seismic test
* Post seismic functional test

In addition, the switch of concern has been both environmentally and seismically qualified in other applications at CPSES.

FAILURE ANALYSIS

Auxiliary feedwater need only be available for power operation, startup, and hot standby. This is in agreement with the proposed CPSES Technical Specification (3.7.1.2) which states that the auxiliary feedwater system be operational for Modes 1, 2 and 3. Fuel load and interim operation in Modes 4, 5 and 6 do not require the availability of the auxiliary feedwater system. Therefore, any failure in these modes would not affect safety. Equipment failure during modes 1, 2 or 3 could prevent the Turbine Driven Auxiliary Feedwater Pump from performing its safety functions if required.

The Auxiliary Feedwater System includes three independent pumps, the turbine driven pump and two motor driven pumps. The motor driven pumps are fully qualified and are capable of accomplishing the safety function of the Auxiliary Feedwater System. Three pumps are provided to allow for a single failure that disables one of the pumps.

The potential for incorrect status, indication or alarm is not expected to mislead the operator. The primary indicators used by the operator are Auxiliary Feedwater Flows to each of the steam generators. These indicators are properly qualified and are part of the Accident Monitoring System for CPSES.

CONCLUSION

The seismic qualification of this panel is only of concern if a seismic event occurs just before or shortly after a design basis accident of concern (as described above) with the unit in Mode 1, 2 or 3 and with a single failure that disables one of the Motor Driven Auxiliary Feedwater Pumps. Considering the remote chance of this chain of events and the facts that this switch has been fully qualified for other applications before and that the panel is expected to be qualified without any modifications, we conclude that CPSES can be safety operated until the seismic qualification of this equipment is

completed. No administrative controls are proposed or considered necessary.

CPSES can be safety operated until this equipment qualification program is completed.

ATTACHMENT (3) TO TXX- 4208

JUSTIFICATION FOR INTERIM OPERATION

QUALIFICATION PACKAGE: MS-611B

EQUIPMENT: BOP Analog Control System
CP1-EIPRCI-01&02
CP1-ECPRLV-01

SUPPLIER/ MANUFACTURER: Westinghouse/7300 Series

SPECIFICATION/ PURCHASE ORDER: 2323-MS-611B/P.O. CP-0611B

SCHEDULED COMPLETION AND CERTIFICATION: December 31, 1984

FUNCTION/APPLICATION:

The Analog Control System processes BOP analog signals which are used to monitor and control the Containment Spray, Auxiliary Feedwater, Component Cooling Water, Station Service Water, Main Steam Relief, Containment Ventilation, Safeguards/Auxiliary Building Ventilation, Spent Fuel Pool Cooling and Liquid Radwaste Systems.

EQUIPMENT FEATURES:

The Analog Control System is an ISD-7300 series which includes the following Class 1E equipment:

1. Two and three bay floor mounted cabinets

TABLE 1

TAG NUMBER	LOCATION	FUNCTION	NORMAL ENVIRONMENT T	P	RH	RAD	CH	ACCIDENT ENVIRONMENT T	P	RH	RAD	CH	OT
CP1-EIPRCI-01 CP1-EIPRCI-02 (Cabinets Cards Card Frames Manual Loading Stations)	Electrical and Control Building (Main Control Room)	Process BOP Analog Protection Signals	75	+0.1 W.G.	50	138 (g)	None	80	+0.1 W.G.	50	Incl. in Normal Dose	None	1 yr
CP1-ECPRLV-01 (Cards Card Frames Manual/Automatic Station) (2)	Safeguards Bldg./Switchgear area	Process BOP Analog Protection	104	Atmo	70	1.01×10^3	None	122	15.09 (1)	100 (1)	Incl. in Normal Dose	None	1 yr. (1)

(1) During a postulated HELB the pressure reaches a peak value of 15.09 psia @ 109°F. for approximately 11 minutes, after which the temperature returns to the normal ambient after approximately 3 hours.

T is Temperature in °F
RAD is Radiation in Rads
Atmo is Atmospheric
YR is Years
P is pressure in psia
W.G. is pressure in inches of water
CH is Chemical Spray
RH is relative humidity in %
OT is operating time during and post-accident
g is gamma

(2) The cabinets themselves are included under package MS-605.

2. Process printed circuit cards mounted in card frames within the cabinets

3. Power Supplies

4. Hot Shutdown A&B Card frames

5. Manual/Automatic Stations

The class 1E equipment is located in mild environment areas, the Main Control Room and the Safeguard Building Switchgear area, as shown in Table 1.

EQUIPMENT QUALIFICATION STATUS

Westinghouse has performed various seismic and environmental qualification tests on the 7300 series analog instrumentation prior to 1983. Because of anomalies in either the test procedure or in the process of testing, Westinghouse has delayed issuing test reports. These anomalies are listed in reference 1 by Westinghouse. Westinghouse has performed tests in 1982 and 1983 that have successfully demonstrated qualification of certain hardware not previously qualified. The following discussion will provide interim justification for use of the 7300 Balance of Plant Analog Instrumentation at CPSES.

The Main Control Room and Switchgear area equipment, with the exception of the Manual/Automatic Stations, have been thermally aged to a life of 5 years at 140^{0}F (Ref.-3). Westinghouse has demonstrated by analysis (Ref.-3) that the required radiation levels at CPSES are below those at which damage would occur and they have also determined that there are no mechanical failure modes. The Main Control Room equipment is located in a mild environment and therefore would only be subjected to a DBE, which in this case would be a simulated seismic event. The equipment located in the switchgear area is affected by a postulated

HELB environment of 109°F and 15.09 psia in 11 minutes time, after which the temperature returns to the normal ambient over a period of three hours.

The Manual/Automatic Stations located in the switchgear area have no mechanical or radiation induced failure modes as explained above. Therefore, the only significant environmental aging condition that applies is thermal aging.

The Manual/Automatic Stations have not been thermally aged, but Westinghouse is presently conducting a material search that they are confident will show no thermal aging mechanisms in the relatively mild environment of the switchgear area. Results of this search will be incorporated into reference 1, which is due to be revised and reissued.

The following printed circuit card types were previously reported as not environmentally qualified (see Ref. 1) and have since successfully demonstrated qualification:

NQP - PREVIOUS - Not qualified environmentally.
PRESENT - Demonstrated environmental qualification in 1983 test.
Summary - Demonstrated total qualification.

NAC - PREVIOUS - Anomaly during environmental test.
PRESENT - Demonstrated environmental qualification during 1983 test.
Summary - Demonstrated total qualification.

The next issue of reference 1 and 3 will reflect the above changes.

Westinghouse has advised the NRC in reference 5 of a potential problem with the Heat Sinks on the NLP cards supplied with their 7300 Process Protection system. The adhesive bond between an insulating washer and the thermal link can cause the heat sink plate to separate from the thermal links and fall off the printed circuit board. The plate is

conductive metal and under certain circumstances could cause shorting of low level signals if it became wedged between cards in the card frame.

Only one NLP card of the design with a potentially defective heat sink bond has been identified at CPSES and it has been replaced. Therefore this anomaly represents no potential problem at CPSES.

The following printed circuit card types were previously reported as not seismically qualified (see Ref. 1) and have since successfully demonstrated qualification:

NRC - PREVIOUS - Anomaly during seismic test.
PRESENT - Demonstrated seismic qualification during 1982 test.
SUMMARY - Demonstrated total qualification.

NMA - PREVIOUS - Anomaly during seismic test.
PRESENT - Demonstrated seismic qualification during 1982 test.
SUMMARY - Demonstrated total qualification.

The next issue of reference 1 and 3 will reflect the above changes.

The NTD card had previously shown intermittent output during a simulated seismic event. Retesting has not completely eliminated the intermittent output, but Westinghouse has indicated that the NTD card operated properly after this seismic test and maintained its physical integrity during the test. Westinghouse has advised that if the intermittent output during a seismic event could not be tolerated, a new NTD group has been designed which eliminates the cause of the intermittent output. The application of the NTD card has been reviewed and it was found that its use for CPSES BOP is limited, and that the intermittent output during a seismic event would not lead to a spurious response, nor would it degrade the performance of the safety system. Therefore, its use at CPSES is justified based on our analysis of its use and required performance.

CONCLUSION:

In our judgement, Westinghouse has demonstrated that the 7300 Series Process Protection System will perform its Class 1E function at CPSES. Anomalies which occurred during testing have all been resolved with the exception of the intermittent output of the NTD card, and this has been determined by our analysis as not to cause a loss of Class 1E function.

The Manual/Automatic Stations were not thermally aged, but are located in a mild environment and Westinghouse is performing a material search analysis to demonstrate that there are no thermal aging mechanisms. The NLP cards supplied with defective heat sink bonds have been replaced.

Therefore, we feel operation until the above open items are closed out by Westinghouse, poses no significant risk to the health and safety of the public. There is no need to designate alternative equipment or to establish interim administrative controls. We have found no evidence that there would be any significant degradation of safety or misleading of the operator.

CPSES can be safely operated until this qualification package is completed.

REFERENCES:

1. CQ-W9525, Rev.-3 Certificate of Qualification for Safety Related Instrumentation.

2. Westinghouse Advanced Energy Systems Division Environmental and Seismic Testing of the Manual/Automatic Control Stations EL:1757, June 1982.

3. WCAP 8587 - Equipment Qualification Data Package Supp. 1, EQDP-ESE-13. Process Protection Sys., Non-Proprietary Summary Report.

4. WCAP 8687 Supp. 2, E13C Equipment Qualification Test Report Process Protection System (Supplemental Testing) Preliminary.

5. Westinghouse Letter to the U.S. Nuclear Regulatory Commission No. NS-EPR-2774 dated June 1, 1983.

ATTACHMENT (4) TO TXX-4208

JUSTIFICATION FOR INTERIM OPERATION

QUALIFICATION PACKAGE: ESE13

EQUIPMENT: Process Protection Sets
TBX-XIELRK-01 through 04

SUPPLIER/ MANUFACTURER: Westinghouse

SPECIFICATION/ PURCHASE ORDER: P.O. CP-0001

SCHEDULED COMPLETION AND CERTIFICATION: November 30, 1984

FUNCTION/APPLICATION:

The Process Protection Sets process analog signals which are used for Reactor Trip, Engineered Safeguards Actuation, and Post-Accident Monitoring.

EQUIPMENT FEATURES:

These sets are ISD 7300 two and three bay cabinets which are part of the reactor protection system. The cabinets are floor mounted with the process cards mounted in card frames. The cabinets are located in the mild environment of the control room.

EQUIPMENT QUALIFICATION STATUS

Comanche Peak has received the test reports E13A, "Process Protection (Seismic Testing)" and E13B, "Process Protection System (Environmental and Supplemental Seismic Testing)".

Westinghouse is presently evaluating the results of supplemental abnormal environment and seismic testing recently completed. This supplemental testing was performed to upgrade the seismic qualification of the 7300 Process Protection System to a level above that required for Comanche Peak and to perform initial testing of some recently developed cards. With the exception of the NPC (Potentiometer), NRC (Relay), NQP (Quad Loop Power Supply), NMT (Master Test), NAI (Annunicator Interface), NCH (Function Generator) and NSC (Converter) cards, seismic qualification for Comanche Peak is adequately documented by the E13A and E13B reports identified above. During this supplemental testing, the following was observed.

a. The NRC, NQP, NMT, NAI cards demonstrated proper operation during the tests.

b. The NPC, NCH, NSC, and cabinet power supply cards exhibited errors which could result in minor changes in system accuracy. The NPC and NCH cards have potentiometers which demonstrated small shifts during the seismic testing. It is expected that the resultant system error will be less than 0.5% based on a maximum pot shift of 1%. The NSC card and cabinet power supply exhibited changes due to input voltage variations that exceeded specification by less than 0.5%. These errors are presently under evaluation by Westinghouse in order to determine that exact effect on the system, but initial evaluation indicates that margins are available to absorb these inaccuracies.

Although tested previously, the NTC (Temperature Channel Test) card exhibited contact bounce during this recent testing and the result has been evaluated and reported as a 10 CFR Part 50.55(e) issue to the NRC on June 1, 1983. Comanche Peak has this NTC card in the Overtemperature and Overpower delta T channels. This contact bounce may lead to a spurious plant trip but cannot degrade safety system performance at CPSES.

The 7300 Process Protection System performance has been demonstrated to be acceptable for Comanche Peak by previous seismic testing. Anomalies which occurred during recent tests are being resolved and corrective actions will be taken as necessary based on the results of the Westinghouse evaluation.

CONCLUSION

It is concluded that Comanche Peak can be operated without compromising safety until the anomolies are resolved and any necessary actions are taken. There is no need to designate alternative equipment or to establish interim administrative controls. We have found no evidence, based on the available test data, that the anomolies noted would significantly degrade any safety function or mislead the operator.

CPSES can be safely operated until this qualification package is completed.

ATTACHMENT (5) TO TXX-4208
JUSTIFICATION FOR INTERIM OPERATION

QUALIFICATION PACKAGE: ESE40

EQUIPMENT: DP Indicating Switches
1-FIS-610 & 611

SUPPLIER/ MANUFACTURER: Westinghouse/ITT Barton
Model 288A/244

SPECIFICATION/ PURCHASE ORDER: P.O. CP-0001

SCHEDULED COMPLETION AND CERTIFICATION: November 30, 1984

FUNCTION/APPLICATION:

The DP Indicating Switches actuate the minimum flow bypass valve to assure adequate flow through its respective RHR pump.

EQUIPMENT FEATURES:

The switches are of the differential bellows type with two switch contacts.

EQUIPMENT QUALIFICATION STATUS

Control of flow in residual heat removal system "mini-flow" lines and resulting protection of RHR pumps is dependent on switch contact action in a differential pressure indicating switch. The Barton model 288A

TAG NUMBER	LOCATION	FUNCTION	NORMAL ENVIRONMENT					ACCIDENT ENVIRONMENT					
			T	P	RH	RAD	CH	T	P	PH	RAD	CH	OT
1-FIS-611	Safeguards Bldg. Pump Room 54	RHR Pump 02 Flow	104	Atmo	70	$4x10^4$	None	122	Atmo	95	$1.57x10^6$	None	1 yr.
1-FIS-610	Safeguards Bldg. Pump Room 51	RHR Pump 01 Flow	104	Atmo	70	$4x10^4$	None	122	Atmo	95	$1.57x10^6$	None	1 yr.

T is temperature in ^{o}F
P is pressure in psig
RH is relative humidity in %
RAD is radiation in RADS
CH is chemical spray
OT is operating time during and post accident

switch in this function was intended to be qualified for service during and after a design basis safe shutdown earthquake. Because of questions raised about switch operation, results from a complete seismic test program in 1977 were considered inadequate to demonstrate successful seismic performance. A description of the original tests and subsequent tests performed to establish seismic qualification and the basis for interim operation with existing DP switches is provided below.

In the original DP switch seismic test, completed in 1977, switch contacts were monitored. A review of analog recordings of switch contact status revealed no intermittent contact status changes in either the normally open or normally closed contacts. No attempt was made to vary measured differential pressure and actuate switch contacts during actual seismic test runs. Acceptance criteria at that time was no contact bounce in the deactivated switches and no effect on performance following seismic testing. Subsequent testing of another model switch revealed that susceptibility to contact bounce in switches of similar design was greater at or near the switch setpoints. In December 1982, two model 288A switches were included in another test then being conducted. During this test, provisions were made to mechanically change the differential pressure and to control the switching of contacts. This test was not comprehensive enough to establish design limits for all switch ranges, however, confidence was provided that except at differential pressures near the switch setpoints, no intermittent contact action might be expected as the result of seismic testing. The switches tested had ranges of 30 psid and 60 inches of water. The 60 inch unit was one of those originally tested in 1977. During each seismic simulation using generic Westinghouse seismic envelope inputs, the switches were either operated through their ranges or held near setpoints. The 30 psid unit showed negligible tendencies for switch bounce, even at positions less than two percent full scale from a switch setpoint. The 60 inch unit from the original test was susceptible to switch (contact) bounce, showing

decreasing sensitivity as the distance from the setpoint was increased. At two percent from the setpoint, contact bounce was extensive. However, less tendency for contact bounce was exhibited at 5% of full scale from the setpoint and during one run in which the switch was held approximately 8% from its setpoint, only two instances of intermittent switch action were observed, each lasting less than two milliseconds.

Several conditions and results of completed testing are pertinent to evaluation of installed performance of the RHR mini-flow DP switch. The Westinghouse seismic test envelope is more severe in both peak acceleration and frequency range than the Comanche Peak required response spectrum. Results of the December 1982 tests indicated that sensitivity to contact bounce decreases as the DP switch range increases. Because the RHR mini-flow switches have a range 3-1/2 times that of the test unit exhibiting significant bounce during test runs, it is expected that its sensitivity to contact bounce would be less. In the most recent test, only slight tendency for bounce was observed on the 60 inch switch at 8% of full scale from the setpoint.

FAILURE ANALYSIS

Pending final verification of the limits of performance of the 288A DP switch, present test results indicate that RHR mini-flow switch operation during a design basis safe shutdown earthquake should assume intermittent switch actuation when the measured differential pressure is 10% or less of full scale from the switch setpoint. The potential for such intermittent switch actuation is acceptable at Comanche Peak as demonstrated by the attached analysis.

CONCLUSION

Based on the testing and failure analysis described above, we have concluded that no significant degradation of any safety function occurs and no misleading information is sent to the operator as a result of

the projected failure of these switches during a seismic event. There is no need to designate alternate equipment or to establish interim administrative controls.

CPSES can be safely operated until this qualification package is completed.

RHR Pump Miniflow DP Switch Seismic Analysis

The purpose of this analysis is to show that the Barton Model 288A DP switches as currently installed on the RHR pump miniflow flow stations, are acceptable "as is" even with an assumed defect of point bounce during a seismic event occurring at positions with ± 10% full scale from a switch setpoint. Acceptable is defined as no significant degradation of either function of: 1) protecting the pump, or 2) providing adequate system flow to the RCS. (This October 31, 1983 revision supersedes the earlier September 23 analysis as "RHR miniflow only" data became available).

REFERENCE DATA: (Note: this data is for 1-FE-610,611, 1-FIS-610,611, or 1-FCV-610,611 as appropriate.)

- DP Switch setpoints: (from Precautions Limitation Setpoint, Rev. 1)

  OPEN miniflow at 576 gpm decreasing (low setpoint)
  CLOSE miniflow at 1200 gpm increasing (high setpoint)

- DP Switch full scale and accuracy:

  Full scale = 1500 gpm ≈ 229 in H_2O dp
  Accuracy = ± 1.5% full scale

- Flow station correlations:

  576 gpm ≈ 33.5 in H_2O dp (low setpoint)
  1200 gpm ≈ 146 in H_2O dp (high setpoint)
  1500 gpm ≈ 229 in H_2O dp

- The ± 1.5% fs accuracy plus the ± 10% fs point bounce range equals ± 11.5% equals ± 26 in H_2O dp.

- The motor operators on the control valves are rated for 15 minutes continuous duty with a stroke time of about 8 seconds. The circuitry of the system ensures that once the valve starts to stroke either open or close (due to a momentary closure of a setpoint switch), it will complete its stroke before it will respond to a new signal to either close or open.

- Flow rate of miniflow only (with the new 3-inch valves at locations 1-FCV-610,611) has been measured to be 750 gpm ≈ 57 in H_2O dp.

ANALYSIS CONDITION #1 - Pump on miniflow only -

Due to a SI signal the RHR pump starts with the miniflow valve open. Injection into the RCS does not occur due to its > 200 psi pressure, thus flow is 750 gpm (57 in H_2O dp). The high setpoint

is greater than 26 in H_2O dp away, thus the miniflow valve will not close. The low setpoint switch might bounce, which would only send a signal to open the already open miniflow valve - no problem here. Condition #1 is acceptable.

ANALYSIS CONDITION #2 - Pump at high injection flow -

The RHR pump flowrate is high (> 1200 gpm) and miniflow is closed either 1) because it is in the residual heat removal mode or 2) because it is drawing from the RWST or containment sump and injecting into a low pressure RCS (or a high pressure RCS with boosting provided by either the SI pumps or the HHSI pumps). The low setpoint is greater than 26 in H_2O dp away, thus the miniflow valve will not open. The high setpoint switch might bounce, which would only send a signal to close the already closed miniflow valve - no problem here. Condition #2 is acceptable.

ANALYSIS CONDITION #3 - Miniflow closes prematurely -

RHR pump is both injecting into the RCS and is still on miniflow because total pump flow has not yet reached 1200 gpm (146 in H_2O dp). Assume, due to point bounce, that miniflow closes at (146 - 26 =) 120 in H_2O dp, flow would be 1087 gpm before miniflow closure and (1087 - 750 =) 337 gpm after miniflow closure. As 500 gpm is the recommended minimum pump flowrate, but 335 gpm (for a maximum of seventeen hours per year) minimum flow has been found acceptable by the manufacturer (reference letter CWS-TBX-1812, dated August 17, 1982), this flow of 337 is acceptable. Additionally, the 337 gpm flow will be short lived because the low setpoint switch will make contact and open the miniflow valve once it strokes closed. It is conceivable that the valve will cycle open and closed (with a $\gtrsim$ 16 second period) for the duration of the seismic event which is assumed to last for less than 15 minutes, which is the continuous duty rating of the motor operator. Thus the pump is protected, system flow to the RCS is not compromised, and Condition #3 is acceptable.

ANALYSIS CONDITION #4 - Miniflow opens prematurely -

RHR flow has already passed the high setpoint, thus miniflow is closed. One RHR pump is aligned to containment sump and is applying water to some combination of SI and HHSI pumps requiring $\gtrsim$ 770 gpm. An increase in RCS pressure (due to an undefined transient) causes injection flow to decrease (and thus RHR flow to decrease) to (33.5 + 26 = 59.5 in H_2O dp ≈) 765 gpm and then miniflow opens due to point bounce at the low setpoint. RHR flow will increase by $\gtrsim$ 750 gpm which will decrease the RHR pump differential head from 195 psid to 185 psid (or by 5.1%). This slight decrease would have no significant effect on the injection flowrate into the RCS. Condition #4 is acceptable.

SUMMARY

All conceivable conditions in which the point bounce during a seismic event occurring at positions within ± 10% f.s. from a switch setpoint

phenomena could occur have been analyzed and found acceptable. Thus, the present Barton Model 288A DP switches installed on the RHR pump miniflow flow stations are acceptable from a seismic standpoint.

Timothy Eckert 10/31/83

Timothy Eckert, Engineer
Results Engineering Department

October 31, 1983

ATTACHMENT (6) TO TXX-4208

JUSTIFICATION FOR INTERIM OPERATION

QUALIFICATION PACKAGE: ESE47

EQUIPMENT: NIS Cabinet, Source Range Detector, Source Range Pre-amplifier
TBX-NIELCA-01 & TBX-NIELDT-01

SUPPLIER/ MANUFACTURER: Westinghouse

SPECIFICATION/ PURCHASE ORDER: P.O. CP-0001

SCHEDULED COMPLETION AND CERTIFICATION: February 28, 1985

FUNCTION/APPLICATION:

The equipment being qualified by this qualification package is required to provide indication and mitigation of a Boron Dilution Event when reactor power is in the source range.

EQUIPMENT FEATURES:

The Source Range Detector, its pre-amplifier and a flux doubling circuit for the NIS Source Range Drawer is the equipment being qualified. This equipment is not required to function in the harsh post accident environment.

			NORMAL ENVIRONMENT					ACCIDENT ENVIRONMENT					
TAG NUMBER	LOCATION	FUNCTION	T	P	RH	RAD	CH	T	P	RH	RAD	CH	OT
TBX-NIELCA-01	Control Room	Flux Doubling Circuit	75	0.1 (2)	50	88	None	N/A	N/A	N/A	N/A	N/A	N/A
TBX-NIELDT-01	Containment Detector Well	Source Range Neutron Detector	140	Atmo	70	2.2×10^{9} (g) 6.3×10^{17} n/cm^{2}	None	N/A	N/A	N/A	N/A	N/A	N/A
--	Safeguards Bldg. Room 96	Source Range Pre-Amplifier	104	Atmo	70	900	None	N/A	N/A	N/A	N/A	N/A	N/A

T is temperature in ^{o}F P is pressure in psig RH is relative humidity in %

RAD is radiation in RADS CH is chemical spray OT is operating time during and post accident

(2) inches wg

EQUIPMENT QUA'.IFICATON STATUS

The Boron Dilution Protection System equipment, which consists of the Source and Intermediate Range Drawers, Source/Intermediate Range Detector and Source Range Pre-Amplifier, has completed seismic and environmental testing. The seismic testing was successfully completed for all equipment. Abnormal environmental testing revealed that the log-current amplifier (located in the Intermediate Range drawer) exhibited errors which exceeded the acceptance criteria. For Comanche Peak this system is located in the control room which has Class 1E HVAC and will not experience an abnormal environment. All other equipment successfully passed the environmental tests.

Although the Source-Range Pre-amplifier successfully passed the seismic and environmental tests, it was noticed to be noise susceptible during system verification testing which leads to an operational concern.

For this reason, a new pre-amplifier (model MK II) was designed. Comanche Peak will operate with this redesigned part. Seismic testing of the pre-amplifier was completed during the first quarter of 1984. Results of the tests were satisfactory, however, during the test the triaxial connector failed. Investigation revealed that the connector had been redesigned by the manufacturer without informing Westinghouse. The older style connector was installed and subsequent seismic test results were satisfactory. The Comanche Peak pre-amplifiers were received with the new style connectors installed. The connectors will be replaced prior to the fuel load.

Upon completion of testing of the MK II pre-amplifier, a draft EQDP-ESE-47B report titled "Boron Dilution Fix (Source and Intermediate Range Drawers and Source Range Pre-Amplifier)" and on EQTR-E47C report titled "NIS Console, Source and Intermediate Range Drawers, Source Range Pre-Amplifier Box (Environmental Testing)" will be issued.

The EQTR-E47B report would also be modified to reflect the redesigned equipment. All reports would then reflect the redesigned equipment. All testing, including reports, will be complete in July 1984, except for EQTR-E47C which will be issued in December 1984.

CONCLUSION

As described above, this equipment has successfully passed all qualification tests except for the redesigned pre-amplifier which has been successfully seismically tested and which is located in a mild environment. The function of this equipment, the indication and mitigation of a Boron Dilution Event while reactor power is in the source range, is not required during or following a design basis accident and there is no evidence that failure of this equipment, post accident, will degrade any safety function or mislead the operator in a manner that affects his ability to safely shutdown the plant and mitigate the accident. There is no need to designate alternative equipment or to establish interim administrative controls.

CPSES can be safety operated until this qualification package is completed.