

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Sequoyah, Unit 2	DOCKET NUMBER (2) 0 5 0 0 0 3 2 8	PAGE (3) 1 OF 0 7
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TITLE (4) Inadequate Vendor Document Control Resulted In Insufficient Seismic Qualification Of Instrument Cabinets Containing Class 1E Devices

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)		
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES		DOCKET NUMBER(S)
1	2	1 0 8 8	8	0 4 1	0	1	0	4 1 3 8 9	Sequoyah, Unit 1		0 5 0 0 0 3 2 7

OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)									
POWER LEVEL (10) 0 5 8	<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.405(c)	<input type="checkbox"/> 50.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)						
	<input type="checkbox"/> 20.405(a)(1)(i)	<input type="checkbox"/> 50.36(c)(1)	<input type="checkbox"/> 50.73(a)(2)(v)	<input type="checkbox"/> 73.71(c)						
	<input type="checkbox"/> 20.405(a)(1)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)						
	<input type="checkbox"/> 20.405(a)(1)(iii)	<input type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)							
	<input type="checkbox"/> 20.405(a)(1)(iv)	<input checked="" type="checkbox"/> 50.73(a)(2)(ii)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)							
<input type="checkbox"/> 20.405(a)(1)(v)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)								

LICENSEE CONTACT FOR THIS LER (12)

NAME J. A. Naik, Plant Reporting Section	TELEPHONE NUMBER 6 1 5 8 4 3 - 6 8 6 2
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS

SUPPLEMENTAL REPORT EXPECTED (14)

<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single space typewritten lines) (16)

This report is revised to provide information on completed corrective actions.

On December 9, 1988, with unit 1 in mode 5 (0 percent power, 330 psig, and 188 degrees F) and unit 2 in mode 1 (58 percent power, 2235 psig, and 565 degrees F) Sequoyah Site, Nuclear Engineering (NE) personnel identified that "as installed" instrument cabinets supplied by the Bailey Meter Company did not meet seismic qualification requirements and issued Condition Adverse to Quality Report (CAQR) SQP880601. The seismic qualification of the cabinets require that two restraint bars be installed on each row of instrument modules in the cabinets. Instead "as installed" cabinets had only one restraint bar installed on each row of instrument modules. In November 1976, the Bailey Meter Company notified TVA that two restraint bars are necessary to effectively restrain instrument modules in the event of a seismic occurrence. This modification was not implemented in 12 instrument cabinets. In these instrument cabinets, 12 level switches (LSs) of the auxiliary feedwater (AFW) system, 2 flow differential switches (FDs) of the component cooling system (CCS), 2 flow switches (FSs) of the containment spray (CS) system, and 16 pressure differential switches (PDSs) of the emergency gas treatment system (EGTS) are mounted, which may not operate in accordance with specifications during a seismic event. However, failure of these switches would not inhibit the plant from achieving and maintaining safe shutdown, therefore, this condition is not considered to have a significant adverse impact on plant or public safety. As corrective action, TVA has installed permanent seismic restraint bars in the affected instrument cabinets as specified by design change notices (DCNs) M01020A for unit 1 and M01021A for unit 2. A generic review of the condition was performed by Nuclear Engineering. The review showed that this was an isolated case. The Bailey Meter Company instrument cabinets have unique module mounting configuration. Therefore, no additional action is necessary.

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		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		

TEXT (If more space is required, use additional NRC Form 366A's) (17)

This report is revised to provide information on completed corrective action.

DESCRIPTION OF CONDITION

On December 9, 1988, with unit 1 in mode 5 (0 percent power, 330 psig, and 188 degrees F) and unit 2 in mode 1 (58 percent power, 2235 psig, and 565 degrees F) Sequoyah Site, Nuclear Engineering (NE) personnel identified that "as installed" instrument cabinets supplied by the Bailey Meter Company (EIIS Vendor Code B045) did not meet seismic qualification requirements and initiated Condition Adverse to Quality Report (CAQR) SQP880601. This condition was first discovered at Watts Bar Nuclear Plant (CAQR No. WBN 880636) and then at Sequoyah during performance of a generic evaluation of the condition for other plants within TVA. The seismic qualification of these cabinets require that two restraint bars be installed on each row of instrument modules in the cabinets. Instead, 12 "as installed" cabinets had only one restraint bar installed on each row of instrument modules. In November 1976, the Bailey Meter Company notified TVA that two restraint bars are necessary to effectively restraint instrument modules in the event of a seismic occurrence. This modification was not implemented for the following listed instrument cabinets.

Unit	Instrument Cabinet	Location
1	1-R-127	Control Building, Elevation 685.0 (EIIS Code NA)
1	1-R-128	Control Building, Elevation 685.0
1	1-R-130	Control Building, Elevation 685.0
1	1-R-131	Control Building, Elevation 685.0
1	1-L-11A	Auxiliary Building, Elevation 734.0 (EIIS Code NF)
1	1-L-11B	Auxiliary Building, Elevation 734.0
2	2-R-127	Control Building, Elevation 685.0
2	2-R-128	Control Building, Elevation 685.0
2	2-R-130	Control Building, Elevation 685.0
2	2-R-131	Control Building, Elevation 685.0
2	2-L-11A	Auxiliary Building, Elevation 734.0
2	2-L-11B	Auxiliary Building, Elevation 734.0

In the above listed instrument cabinets, the following listed safety-related instruments of each units are mounted.

Instrument Identification	System
1. Level switch (LS) LS-3-174B, 164B, 148B, 172B 156B, 173B, 171B, 175B 164D, 156D, 172D, 175D	Auxiliary feedwater (AFW) (EIIS Code BA)
2. Flow differential switch (FDS) FDS-70-81E, 81B	Component cooling system (CCS) (EIIS Code CC)

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

- | | |
|---|---|
| <ul style="list-style-type: none"> 3. Flow switch (FS)
FS-72-13, 34 4. Pressure differential switch (PDS)
PDS-65-80A, 80B, 80C, 80D
-82A, 82B, 82C, 82D
-90A, 90B, 90C, 90D
-97A, 97B, 97C, 97D | <ul style="list-style-type: none"> Containment spray (CS)
(EIIS Code BE) Emergency gas treatment system
(EGTS) (EIIS Code BH) |
|---|---|

The above listed instruments can be divided into two types of electronic devices.

1. Electronic devices that do not change state (e.g., power supply).
2. Electronic devices that do change state (e.g., actuates alarms).

Immediately, plant management requested NE to perform a field walkdown and evaluate "as installed" configuration of the instruments. The engineering evaluation revealed the following information:

1. The modules are mounted in a "pan" (i.e., cabinet drawer). The modules are restrained in the side-to-side direction by "brass stabs" at the back of the pan and the module cutouts at the front of the pan. The modules are restrained in the vertical direction by a clip at the rear of the pan, the module cutouts at the front of the pan and the pan bottom. The modules are restrained in the back direction by the module flange and pan cutout. The modules' only degree of freedom is moving forward out of the pan.
2. The clearance between the door and the module is much smaller than the length of the ribbon connecting the module to the rack/panel and the length of the module. Thus, with the door closed, the ribbon will remain connected to the rack and the module will not fall out of the panel even if the module is moved forward and contacts the door.

The engineering evaluation also concluded the following:

For the modules classified as electronic devices that do not change state, inoperability of a system required for startup, operation, or shutdown by the appropriate technical specifications is not affected by a seismic event.

For the modules classified as electronic devices that do change state, it must be assumed (based on past experience) that the module will not operate in accordance to specifications during a seismic event. However, there is not a significant probability of malfunction of the module (based on past industry experience) after a seismic event. At 1100 EST, on December 10, 1988, upon notification of the inadequacy of seismic qualification for these instrument cabinets, the shift operations supervisor (SOS) entered Limiting Condition for Operation (LCO) 3.0.3, and notified NRC as required by 10 CFR 50.72 reporting requirements.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

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As specified by corrective action of revision 0 of this LER, temporary alteration to the affected instrument cabinets was implemented to both units. On February 1, 1989, with unit 1 in mode 1 (100-percent power, 2235 psig, 578 degrees F) and unit 2 in mode 5 (0 percent power, 0 psig, 115 degrees F) the NRC resident inspector notified TVA, that air craft cables installed in the above described instrument cabinets were not "snug tight" as specified by the Temporary Alteration Control Form (TACF) No. 1-88-22-500 for unit 1 and TACF No. 2-88-2019-500 for unit 2. The NRC concern was that during seismic event, the module could move forward out of the support pan, thus disengaging the rear clip that provides vertical restraint at the rear of the module. Subsequently, the shift operation supervisor (SOS) entered LCO 3.0.3 at 1700 EST, on February 1, 1989, for unit 1 as an operation prohibited by Technical Specification. Unit 2 was in mode 5 and no LCO entry was necessary, because the effected instruments were not required in this mode. Generic Letter 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors," states that, "the seismic event does not cause a loss-of-coolant accident (LOCA), a steam-line-break accident (SLBA), or energy-line-break (HELB) does not occur simultaneously with or during a seismic event." It further states that, "the plant must be capable of being brought to a safe shutdown condition following a design-basis seismic event." Affected devices were evaluated to be not required for safe shutdown of the plant. Further, engineering evaluation of the condition revealed, that "as installed" air craft cables were acceptable and ensured seismic qualifications of the instrument cabinets. Additionally, the need for vertical restraint initially intended to be provided by the rear clip was evaluated to be unlikely, since vertical uplift force during a seismic event would not overcome dead weight load of the module. Based on the generic letter, engineering evaluation, and since the safe shutdown capabilities of the plant was not affected by this condition the SOS decided that no other action was necessary and excited LCO 3.0.3.

CAUSE OF CONDITION

The instrument cabinets were procured from the Bailey Meter Company during the construction era of the plant. Initially, the vendor drawings did not include two restraint bars for the required seismic qualification of the cabinets.

In November 1976, the vendor performed an audit of their documentation and discovered that Sequoyah and Watts Bar instrument cabinets lacked restraining bars and notified TVA to modify the instrument cabinets.

TVA had received the installation instruction and revised drawings depicting locations of additional restraining bars within the instrument cabinets. During the plant construction era, such notifications to the Sequoyah construction manager were provided by the project manager via engineering change notices, interoffice memorandums, or field change notices as appropriate.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

This information was sent to construction manager to ensure that the specified modification to vendor components was implemented before final installation. However, this process did not provide positive administrative control in this case, and as a result the subject instrument cabinets were not modified before final installation.

ANALYSIS OF CONDITION

This condition was initially reported as a condition that resulted in the nuclear plant being outside the design basis, and accordingly reported in accordance with 10 CFR 50.73, paragraph a.2.ii.B.

Generic Letter 87-02, "Verification of Seismic Adequacy of Mechanical and Electrical Equipment in Operating Reactors," states that, "the seismic event does not cause a LOCA, and a SLBA, or a high HELB, and a LOCA, SLBA, or HELB does not occur simultaneously with or during a seismic event." It further states that, "the plant must be capable of being brought to a safe shutdown condition following a design-basis seismic event." For the devices identified, safe shutdown of the plant can be achieved and maintained, as none of the affected devices are required for safe shutdown.

The unqualified instrument cabinets could have caused the instrument switches to chatter or change position unnecessarily during an earthquake. This could have allowed abnormal equipment operation or the plant to trip in the event of a seismic event.

The CCS FDSs isolate the CCS thermal barrier booster flow path on high differential flow. This flow path does not serve any safety-related heat exchanger (Hx). This interlock is an equipment protection interlock to prevent contaminating and/or overpressurizing the CCS in the event of a thermal barrier Hx tube failure. If the FDSs cause the flow path to isolate unnecessarily, the reactor coolant pump (RCP) seals will be protected from overheating by chemical and volume control system (CVCS) seal injection. The thermal barrier piping has a design pressure of 2485 psig, and the CCS thermal barrier Hx is designed to remain functional during and following an earthquake up to and including a safe shutdown earthquake.

However, if the FDSs fail to isolate the CCS flow path when there is an inleakage from the reactor coolant system (RCS) following an earthquake, the CCS radiation monitors (0,1,2-RE-90-123) will alarm in the main control room (MCR) and isolate the CCS vent line from the surge tank. The radiation and surge tank high level alarms on each train are designed to provide a means of detecting tube failures in the various Hx. MCR flow and pressure alarms on each thermal barrier Hx also provide a means of detecting tube ruptures in the Hx. Each Hx is provided with a pressure relief valve to prevent overpressurization. Therefore, if the FDSs fail, the operator has adequate instrumentation provided to allow for manual action.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

The CS system FSS open the CS pump miniflow line. The miniflow line provides pump protection in the event of the pump working against a dead head. The only way the flow path can be restricted in an accident condition is if the CS header isolation valve did not open. A header valve not opening would qualify as the single failure, and the opposite train would provide adequate flow for accident mitigation. Thus, the opening of the miniflow line is not required for accident mitigation. If the miniflow valve opened unnecessarily, the CS pump will provide adequate flow to the spray headers with the miniflow valve open. Therefore, the FSS are for equipment protection and not accident mitigation. Additionally, CS is not needed to achieve or maintain safe shutdown.

The AFW system LSS generate a "hi steam generator (S/G) level" signal. The LSS are interlocked with the main feedwater regulating and bypass level control valves (LCVs). This signal will close the LCVs for the respective S/G. If the LSS fail to close the LCVs, the "hi-hi S/G level" signal made up from different LSS will initiate feedwater isolation, and trip the unit. If the LSS fail and cause the LCVs to close unnecessarily, the S/G level will drop. Thus, the "lo-lo S/G level" signal, made up from different LSS, will initiate the AFW system start and trip the unit.

Also, these LSS are part of the anticipated transient without scram mitigating system actuation circuitry (AMSAC) initiation system. The AMSAC system is a redundant backup to the reactor protection system. The AMSAC system is not operational at this time.

The EGTS PDSs open and close the EGTS containment annulus air cleanup vent valves. These valves help maintain the required negative pressure in the annulus when the unit is in an accident condition. Redundant trains of air cleanup lines exist to maintain the required annulus pressure. Thus, the EGTS ensures that following an accident, leakage into the annulus will be filtered prior to discharge into the environment.

Therefore, failure of these switches would not inhibit the plant from achieving and maintaining safe shutdown, this condition is not considered to have had a significant adverse impact on plant or public safety.

CORRECTIVE ACTION

Upon receipt of notification of inadequacy of seismic qualification of instrument cabinets, the SOS determined that various LCOs were applicable to this condition. Subsequently, the SOS entered LCO 3.0.3 at 1100 EST on December 10, 1988 for unit 2 as an operation prohibited by technical specification and complied with the action statement. Unit 1 was in mode 5 and no LCO entry was necessary because the effected instruments are not required in this mode.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

As immediate corrective action, to ensure the seismic qualification of the unit 2 instrument cabinets, temporary alteration to the cabinets was performed as specified by Administrative Instruction (AI)-9 "Control of Temporary Alterations, and Use of the Temporary Alterations Order." The temporary alteration consisted of installation of a 3/64-inch diameter aircraft cable across the front face of the instrument modules. The aircraft cable provided a stable and adequate restraint until permanent seismic restraints were installed. Upon completion of the temporary alteration, the SOS exited LCO 3.0.3 at 1452 EST, on December 10, 1988. The temporary alteration was documented in accordance with Temporary Alteration Control Form (TACF) No. 2-88-2019-500.

A similar temporary alteration to unit 1 instrument cabinets was completed by December 13, 1988 and was documented in accordance with TACF No. 1-88-22-500.

TVA has now installed permanent seismic restraint bars in the affected instrument cabinets as specified by design change notice (DCN) M01020A for unit 1 on February 12, 1989, and DCN M01021A for unit 2 on March 23, 1989. Aircraft cable across the front face of the instrument modules which was installed as immediate corrective action was removed upon installation of the permanent seismic restraint bars.

A generic review of the condition was performed by Nuclear Engineering. The review showed that this was an isolated case. The Bailey Meter Company instrument cabinets have unique module mounting configuration. The review also showed that Engineering Design (EN-DES) Procedure EP5.11 originally issued on September 17, 1974, required that changes made by the vendor to his drawing are handled the same as for the original issue. This procedure was utilized until the development and issue of the Nuclear Engineering Procedures (NEPs). Existing NEP 4.1, "procurement" and NEP 9.1, "corrective action," should prevent recurrence of this condition as appropriate personnel training has been conducted on these procedures. Therefore, no additional action is necessary.

ADDITIONAL INFORMATION

There was no previous occurrence of seismic qualification of instrument cabinets outside the plant design basis due to similar causes. The instrument cabinets are the Bailey Meter Company System 5000.

COMMITMENTS

None.

0353Q

TENNESSEE VALLEY AUTHORITY

Sequoyah Nuclear Plant
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April 13, 1989

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

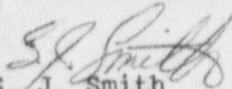
Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT UNIT 1 AND 2 - DOCKET
NOS 50-327 AND 50-328 - FACILITY OPERATING LICENSE DPR-77 AND DPR-79
LICENSEE EVENT REPORT (LER) 50-328/88041 REVISION 1

The enclosed licensee event report is revised to provide information on
completed corrective action, that was a result of insufficient seismic
qualification of instrument cabinets containing class 1E devices. This
event was reported on January 6, 1989, in accordance with 10 CFR 50.73,
paragraph a.2.ii.B.

Very truly yours,

TENNESSEE VALLEY AUTHORITY


S. J. Smith
Plant Manager

Enclosure
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