NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Sequoyah, Unit 1	0 5 0 0 0 3 2 7	1 OF 0 6

TITLE (4) Seismic Monitor Annunciator Switches Were Outside Acceptable Limits Due To An Inadequate Instruction

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)
0 1	2 7	8 9	8 9	0 0 4	0 1	0 4	2 7	8 9	Sequoyah, Unit 2	0 5 0 0 0 3 2 8
										0 5 0 0 0

OPERATING MODE (9): 1

POWER LEVEL (10): 1 0 0

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
20.405(a)(1)(iii)	X 50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (AREA CODE)
A. W. Thomas, Plant Reporting Section	6 1 5 8 4 3 - 7 1 1 8 2

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)

YES (If yes, complete EXPECTED SUBMISSION DATE) X NO

EXPECTED SUBMISSION DATE (15): MONTH | DAY | YEAR

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

This LER revision provides NRC with an update of the causes and corrective actions taken as a result of this event.

On January 27, 1989 at 1639 EST with unit 1 in mode 1 (100-percent power) and unit 2 in mode 5 (cold shutdown) Operations (OPS) personnel were notified by Instrument Maintenance (IM) personnel that not all annunciator switches of the active triaxial response spectrum recorder (0-XR-52-86) had been left within acceptance criteria during the performance of Surveillance Instruction (SI)-125, "Channel Calibration Of Seismic Monitoring Instrumentation," conducted between December 16, 1988 and January 14, 1989. It was later discovered that the acceptance criteria contained within SI-125 for the annunciator switches were nonconservative when compared to ANSI N18.5, "Earthquake Instrumentation Criteria for Nuclear Power Plants." Several causes were identified for this event. One of the causes was that vendor manual information was incorrectly interpreted and used to develop SI-125. Also, the switch setpoints being outside their acceptable range was due to conflicting acceptance criteria in the SI. As immediate corrective action, OPS declared seismic monitor 0-XR-52-86 inoperable and entered Limiting Condition For Operation (LCO) 3.3.3.3 after being notified that not all switches had been left within acceptable limits. Subsequently, changes were made to SI-125 to correct the tolerances for the switches. The applicable portion of SI-125 was then reperformed, and the LCO was exited on February 3, 1989.

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This LER revision provides NRC with an update of the causes and corrective actions taken as a result of this event.

DESCRIPTION OF EVENT

On January 27, 1989 at 1639 EST with unit 1 in mode 1 (100 percent reactor power, 2235 psig, and 578 degrees F), and unit 2 in mode 5 (0 percent reactor power, 0 psig, and 114 degrees F), Operations (OPS) personnel were notified by Instrument Maintenance (IM) personnel that not all channels of the active triaxial response spectrum recorder (EIIS Code IN) had been left within acceptance criteria during the performance of Surveillance Instruction (SI)-125, "Channel Calibration Of Seismic Monitoring Instrumentation," conducted between December 16, 1988 and January 14, 1989.

The active triaxial response spectrum recorder (0-XR-52-86) consists of two horizontal recorders (one east-west and one north-south) and one vertical recorder. The location of 0-XR-52-86 is in the unit 1 reactor building on the base slab at elevation 679.78 in the annulus between the shield building wall and the containment vessel. The instrument functions to record maximum amplitudes over a set of 12 discrete frequencies within the specified bandwidth of 2-25.4 Hz. The recorder also activates an annunciator in the main control room (EIIS Code NA) when preset acceleration levels at one or more frequencies of 5.0, 6.4, 10.1, and 16.0 Hz are exceeded.

During the review of the SI-125 test data package after its completion, an IM foreman discovered that the "as-left" value for switch No. 3 (reed No.8) of the horizontal east-west recorder had been recorded as having been left at 15.0 degrees from horizontal while the SI-125 acceptance criteria specified limits of 10.4 $\pm$ 3 degrees from horizontal. Also, all four switches for the vertical recorder had been recorded as being left outside the acceptance criteria. Subsequent to the discovery, OPS personnel were notified, and Technical Specification (TS) Limiting Condition For Operation (LCO) 3.3.3.3 action was entered at 1639 EST on January 27, 1989.

After the discovery that not all switches had been recorded as being left within acceptance criteria, the bases for the acceptance criteria were researched. A review of the Final Safety Analysis Report (FSAR) and the bases for the TS, in conjunction with discussions with the vendor (Engdahl Enterprises), led to the conclusion that the acceptance criteria contained within SI-125 was not in agreement with that provided in the discussions with the vendor or that contained within ANSI N18.5-1974, "Earthquake Instrumentation Criteria For Nuclear Power Plants." The bases for TS LCO 3.3.3.3 states the instrumentation is consistent with the recommendations of Regulatory Guide 1.12, "Instrumentation For Earthquakes, April 1974." Further, FSAR Paragraph 3.7.4 for the seismic instrumentation program states the instrumentation meets the requirements of Regulatory Guide 1.12. Regulatory Guide 1.12 endorses ANSI N18.5 with certain exceptions. Therefore, the allowable tolerances should be consistent with ANSI N18.5.

ANSI N18.5 establishes that seismic instruments and their interconnections shall be installed so that the instrumentation station shall be capable of providing data with an overall error of not more than ± 5 percent at full scale, changing linearly to ± 1.5 percent of .01 g over the appropriate range of environmental conditions such as, temperature, humidity, pressure, vibration, and radiation. In all instances, the acceptable tolerances in SI-125 of ± 3 degrees were less conservative than the limits provided by ANSI N18.5.

Subsequent to establishing the appropriate acceptance criteria, the necessary changes were made to SI-125, and O-XR-52-86 was recalibrated. The recalibration was completed on February 3, 1989, and LCO 3.3.3.3 was exited at 1151 EST.

CAUSE OF EVENT

The "as-left" value for switch No.3, for the horizontal east-west recorder that was recorded in SI-125 as being outside of acceptance criteria, was later found to be the within those acceptance criteria during recalibration of O-XR-52-86. It is therefore concluded that the "as-left" value had been incorrectly recorded in the SI-125 test data and that the switch had actually been left within what was then considered to be the acceptance criteria.

The "as found" data taken during the recalibration of the vertical switches indicates that the vertical switches had been left outside of the acceptance criteria. A review of SI-125 revealed that the vertical recorder switches are calibrated differently than the horizontal switches. The horizontal switch calibration is accomplished by tilting the recorder to predetermined angles, both clockwise and counter clockwise, and verifying the switches operate at the desired tilt. The switches are then adjusted as necessary to operate within the acceptable limits. The vertical calibration is more complex as it requires the tilt angle to be measured for the "up" switches, and for the upward and downward forces to be measured for the "down" switches. After obtaining the aforementioned data, the g-forces for the "down" switches are calculated. Adjustments to the switches are then made as necessary to meet the acceptance criteria. Acceptance criteria was given in both degrees (± 3 degrees) and force (± 3 g) with the two not agreeing. Completion of the SI was necessary to exit LCO 3.3.3.3, and this portion of the SI was being performed in the final hours of the 30 days action. The conflicting acceptance criteria confused personnel performing the SI. Because the data taken was in degrees and the resulting force in grams was calculated, the incorrect assumption was made that the acceptance criteria in degrees was correct and data recorded was verified to be within the acceptance criteria specified in degrees. When personnel performing the SI identified conflicting acceptance criteria they elected to continue the performance of the SI and did not stop work, contrary to Administrative Instruction (AI)-47, "Conduct of Testing."

The cause of the acceptance criteria in SI-125 not being in accordance with ANSI-N18.5 is that vendor information was incorrectly interpreted and used to develop SI-125. The vendor manual specifies the recorders to have an acceleration accuracy of ± 3 percent full scale. TVA had considered full scale to be 90 degrees with a tolerance of ± 3 percent (2.7 degrees rounded up to 3 degrees). However, the correct full scale value should have been based upon 1.0 g ± 3 percent according to a discussion with the vendor. Since ANSI N18.5 allowed a full scale accuracy of ± 5 percent of 1.0 g, the accuracy of ± 3 percent of full scale was within the accuracy established by ANSI. However, the ± 3 percent was applied to the tilt angle instead of the g-force and further, was not changed linearly as specified by ANSI. As a result, the acceptable limits specified in SI-125 were not in accordance with ANSI and were different in a nonconservative direction.

Operations was not notified that several channels of the active triaxial response spectrum recorder were outside of acceptance criteria until 13 days after SI-125 had been completed. The excessive time for review and identification of the switch setpoints being outside of the acceptance criteria is considered to have been partially attributed to the workload resulting from restart activities. Eight of the 13 days for completion of the review was due to the quantity and complexity of the information to be reviewed plus the foreman's workload; two days for the completion of the review was due to the quantity and complexity of the information to be reviewed plus the independent reviewer's workload, and the remaining three days for the completion of the review was due to engineering evaluation of the work package. Normal review cycle is five days from completion until placed in QA record storage, and no corrective action is necessary as result of this event.

ANALYSIS OF EVENT

The active triaxial response spectrum recorder is required to be operable at all times according to TS LCO 3.3.3.3. SI-125 allowed the switches to be left outside what should be considered the acceptable limits, as previously described. As a result, this event is reportable pursuant to 10 CFR 50.73, paragraph a.2.i.b as an operation prohibited by TS.

The following seismic instrumentation exists to detect and/or record seismic events in addition to the active triaxial response spectrum recorder:

1. Strong motion triaxial accelerometer in the unit 1 reactor building at elevation 679.78 in the annulus.

2. Strong motion triaxial accelerometer in unit 1 reactor building at elevation 733.63.

3. Strong motion triaxial accelerograph in diesel generator building.

4. Three biaxial seismic acceleration switches in the unit 1 reactor building at elevation 679.78 in the annulus.

5. Three passive triaxial response spectrum recorders (triggers) located in the unit 1 reactor building, auxiliary control room, and the diesel generator building. The switches for the active response spectrum recorder are calibrated to a preset value to provide annunciation in the main control room whenever the 1/2 safe shutdown earthquake (SSE) design response spectrum has been exceeded (.09 g). The operator will follow Abnormal Operating Instruction (AOI)-9, "Earthquake," and use this annunciator in conjunction with the annunciators of the seismic trigger and the accelerometer to determine, in his judgment, as to whether an earthquake occurred. Since several alternate channels of seismic instrumentation would have been available to detect and record a seismic event, it is likely that the operator would have been able to detect a 1/2 SSE and responded according. Also, the recording function of 0-XR-52-86 was operable and capable of recording a seismic event. As a result, it is concluded that this condition posed no significant safety consequences.

CORRECTIVE ACTION

As was previously described, OPS immediately declared seismic monitor 0-XR-52-86 inoperable and entered LCO 3.3.3.3 after being notified that not all switches had been left within acceptance criteria. Subsequently, changes were made to SI-125 to correct the tolerances for the switches. The applicable portion of SI-125 was then reperformed, and the LCO was exited on February 3, 1989.

SI-125 has been reviewed to confirm that the remaining TS seismic monitors have acceptance criteria within ANSI-N18.5. Also, SI-125, which is performed every 18 months, was recently completed. As a result, the calibration of the seismic monitors presently is not in question.

A review of LERs submitted after the completion of the SI Technical Adequacy Review Porogram indicates no occurrences of SIs with incorrect acceptance criteria. Hence, a generic procedure problem is not implied and this event is considered to be an isolated case.

Site personnel involved in the performance of SI-125 who calibrated 0-XR-52-86 and did not stop work when it was identified that the acceptance criteria was questionable, will be counseled regarding their incorrect actions and will be advised of the proper actions to take if a similar situation should occur in the future. This will be completed by June 30, 1989.

ADDITIONAL INFORMATION

Seismic monitor 0-XR-52-86 is manufactured by Engdahl Enterprise of Costa Mesa, California. The recorder is model PSR1200-H/V-4A.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6) YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	PAGE (3)
Sequoyah, Unit 1	0 5 0 0 0 3 2 7	8 9	— 0 0 4	— 0 1	0 6 OF 0 6

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

There have been 26 previous reported LERs as the result of inadequate surveillance instructions. Reference: LERs SQRO-50-327/86011, 86013, 86028, 86030, 86035, 86040, 86042, 86044, 86050, 87002, 87004, 87006, 87007, 87008, 87014, 87017, 87018, 87022, 87023, 87024, 87031, 88027, SQRO-50-328/88006, 86007, 87002, and 88033. None of these LERs involved seismic monitors.

COMMITMENTS

TVA will counsel site personnel involved in the calibration of 0-XR-52-86 who did not stop work when it was recognized that the two sets of acceptance criteria were not in agreement, and advise those individuals of the proper action to take. This will be completed by June 30, 1989.

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TENNESSEE VALLEY AUTHORITY

Sequoyah Nuclear Plant
Post Office Box 2000
Soddy-Daisy, Tennessee 37379

April 27, 1989

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

Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT UNIT 1 - DOCKET NO. 50-327 - FACILITY OPERATING LICENSE DPR-77 - LICENSEE EVENT REPORT (LER) 327/89004 REVISION 1

The enclosed licensee event report provides additional information regarding the causes of the event and corrective actions to be taken to preclude recurrence of this event. This event was originally reported in accordance with 10 CFR 50.73, paragraph a.2.i.b on February 23, 1989.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

S. J. Smith
Plant Manager

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