



Tennessee Valley Authority, Sequoyah Nuclear Plant, P.O. Box 2000, Soddy Daisy, Tennessee 37384

July 15, 2016

10 CFR 50.73

ATTN: Document Control Desk  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001


Sequoyah Nuclear Plant, Units 1 and 2  
Renewed Facility Operating License Nos. DPR-77 and DPR-79  
NRC Docket Nos. 50-327 and 50-328

Subject: **Licensee Event Report 50-327 and 50-328/2016-004-00, Emergency Diesel Generator Fire Dampers and Crankcase Pressure Switches Not Analyzed for Withstanding the Effects of a Tornado**

The enclosed Licensee Event Report provides details concerning the Emergency Diesel Generator fire dampers and crankcase pressure switches not being analyzed for withstanding the effects of a tornado. This report is being submitted in accordance with 10 CFR 50.73(a)(2)(ii)(B), as an event or condition that resulted in the nuclear power plant being in an unanalyzed condition that significantly degraded plant safety.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this submittal, please contact Michael McBrearty, Site Licensing Manager, at (423) 843-7170.

Respectfully,

  
Christopher J. Schwarz  
Site Vice President  
Sequoyah Nuclear Plant

Enclosure: Licensee Event Report 50-327 and 50-328/2016-004-00  
cc: NRC Regional Administrator – Region II  
NRC Senior Resident Inspector – Sequoyah Nuclear Plant



**LICENSEE EVENT REPORT (LER)**

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

|  |                                     |                          |
|--|-------------------------------------|--------------------------|
| <b>1. FACILITY NAME</b><br>Sequoyah Nuclear Plant Unit 1 | <b>2. DOCKET NUMBER</b><br>05000327 | <b>3. PAGE</b><br>1 OF 6 |
|--|-------------------------------------|--------------------------|

**4. TITLE**  
Emergency Diesel Generator Fire Dampers and Crankcase Pressure Switches Not Analyzed for Withstanding the Effects of a Tornado

| 5. EVENT DATE |     |      | 6. LER NUMBER |                   |         | 7. REPORT DATE |     |      | 8. OTHER FACILITIES INVOLVED  |               |
|---------------|-----|------|---------------|-------------------|---------|----------------|-----|------|-------------------------------|---------------|
| MONTH         | DAY | YEAR | YEAR          | SEQUENTIAL NUMBER | REV NO. | MONTH          | DAY | YEAR | FACILITY NAME                 | DOCKET NUMBER |
| 05            | 16  | 2016 | 2016          | 004               | 00      | 07             | 15  | 2016 | Sequoyah Nuclear Plant Unit 2 | 05000328      |
|               |     |      |               |                   |         |                |     |      | FACILITY NAME                 | DOCKET NUMBER |
|               |     |      |               |                   |         |                |     |      | NA                            |               |

|                          |  |   |  |   |
|--------------------------|--|---|--|---|
| <b>9. OPERATING MODE</b> | <b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b> |   |  |   |
| 1                        | <input type="checkbox"/> 20.2201(b)  | <input type="checkbox"/> 20.2203(a)(3)(i)   | <input type="checkbox"/> 50.73(a)(2)(ii)(A)            | <input type="checkbox"/> 50.73(a)(2)(viii)(A) |
|                          | <input type="checkbox"/> 20.2201(d)  | <input type="checkbox"/> 20.2203(a)(3)(ii)  | <input checked="" type="checkbox"/> 50.73(a)(2)(ii)(B) | <input type="checkbox"/> 50.73(a)(2)(viii)(B) |
|                          | <input type="checkbox"/> 20.2203(a)(1)   | <input type="checkbox"/> 20.2203(a)(4)      | <input type="checkbox"/> 50.73(a)(2)(iii)              | <input type="checkbox"/> 50.73(a)(2)(ix)(A)   |
|                          | <input type="checkbox"/> 20.2203(a)(2)(i)  | <input type="checkbox"/> 50.36(c)(1)(i)(A)  | <input type="checkbox"/> 50.73(a)(2)(iv)(A)            | <input type="checkbox"/> 50.73(a)(2)(x)       |
| 10. POWER LEVEL          | <input type="checkbox"/> 20.2203(a)(2)(ii)   | <input type="checkbox"/> 50.36(c)(1)(ii)(A) | <input type="checkbox"/> 50.73(a)(2)(v)(A)             | <input type="checkbox"/> 73.71(a)(4)          |
|                          | <input type="checkbox"/> 20.2203(a)(2)(iii)  | <input type="checkbox"/> 50.36(c)(2)        | <input type="checkbox"/> 50.73(a)(2)(v)(B)             | <input type="checkbox"/> 73.71(a)(5)          |
|                          | <input type="checkbox"/> 20.2203(a)(2)(iv)   | <input type="checkbox"/> 50.46(a)(3)(ii)    | <input type="checkbox"/> 50.73(a)(2)(v)(C)             | <input type="checkbox"/> 73.77(a)(1)          |
|                          | <input type="checkbox"/> 20.2203(a)(2)(v)  | <input type="checkbox"/> 50.73(a)(2)(i)(A)  | <input type="checkbox"/> 50.73(a)(2)(v)(D)             | <input type="checkbox"/> 73.77(a)(2)(i)       |
|                          | <input type="checkbox"/> 20.2203(a)(2)(vi)   | <input type="checkbox"/> 50.73(a)(2)(i)(B)  | <input type="checkbox"/> 50.73(a)(2)(vii)              | <input type="checkbox"/> 73.77(a)(2)(ii)      |
|                          | <input type="checkbox"/> 50.73(a)(2)(i)(C)   | <input type="checkbox"/> OTHER              | Specify in Abstract below or in NRC Form 366A          |   |

**12. LICENSEE CONTACT FOR THIS LER**

|                                       |  |
|---------------------------------------|--|
| LICENSEE CONTACT<br>Rebecca L. Travis | TELEPHONE NUMBER (Include Area Code)<br>423-843-8335 |
|---------------------------------------|--|

**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

| CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX |
|-------|--------|-----------|---------------|--------------------|-------|--------|-----------|---------------|--------------------|
|       |        |           |               |                    |       |        |           |               |                    |

|  |   |
|--|---|
| <b>14. SUPPLEMENTAL REPORT EXPECTED</b><br><input checked="" type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input type="checkbox"/> NO | <b>15. EXPECTED SUBMISSION DATE</b><br>MONTH: 10, DAY: 14, YEAR: 2016 |
|--|---|

**ABSTRACT** (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On May 16, 2016, at 2105 Eastern Daylight Time (EDT), Sequoyah Nuclear Plant (SQN) identified a nonconforming condition involving the Emergency Diesel Generator (EDG) fire dampers installed for Units 1 and 2. Specifically, it has been identified that if a tornado causes a differential pressure across the east and west sides of the EDG Building, the associated ventilation fire dampers have not been analyzed to withstand the corresponding high air flow rate that could result from this condition and could possibly fail in a way that impedes airflow for EDG cooling. On June 8, 2016, at 1526 EDT, SQN determined that a tornado could potentially cause actuation of the EDG crankcase pressure trip due to a low barometric condition that could result in an EDG lockout condition. The EDG lockout condition prevents subsequent EDG starts (normal or emergency) until operators manually reset the lockout condition locally at the EDG.

Corrective actions include establishing compensatory measures to block the fire dampers in the open position in the event that a Tornado Watch/Warning is issued for the Hamilton County, Tennessee area. In addition, a compensatory measure has been established, that upon notification of a Tornado Warning, the EDGs will be emergency started and operated during the time the Tornado Warning is in effect to bypass the crankcase pressure trip function and allow the EDGs to perform their required safety function. The apparent cause of these events is still under investigation. When the final investigation is completed, a supplement to this LER will be provided.

NRC FORM 366A  
(11-2015)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104

EXPIRES: 10/31/2018



## LICENSEE EVENT REPORT (LER) CONTINUATION SHEET

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA, Privacy and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to Infocollects.Resource@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

| 1. FACILITY NAME              | 2. DOCKET NUMBER | 3. LER NUMBER |                   |         |
|-------------------------------|------------------|---------------|-------------------|---------|
|                               |                  | YEAR          | SEQUENTIAL NUMBER | REV NO. |
| Sequoyah Nuclear Plant Unit 1 | 05000327         | 2016          | - 004             | - 00    |

### NARRATIVE

#### I. PLANT OPERATING CONDITIONS BEFORE THE EVENT

At the time of the events, Sequoyah Nuclear Plant (SQN) Unit 1 and Unit 2 were in Mode 1 at 100 percent rated thermal power.

#### II. DESCRIPTION OF EVENTS

##### A. Event:

On May 16, 2016, at 2105 Eastern Daylight Time (EDT), Sequoyah Nuclear Plant (SQN) identified a nonconforming condition involving the Emergency Diesel Generator (EDG) [EIS Code EK and DG] fire dampers [EIS Code DMP] installed for Units 1 and 2. Specifically, it has been identified that if a tornado causes a differential pressure across the east and west sides of the EDG Building, this could create a high airflow rate through the EDG Building ventilation path. The fire dampers for each EDG bay have not been analyzed to withstand high air flows resulting from a tornado and could possibly fail in a way that impedes airflow for EDG cooling. This is an unanalyzed condition that potentially significantly degrades plant safety and could prevent all EDGs from supplying electrical power as designed during a tornado or other similar weather events.

On June 8, 2016, at 1526 EDT, another issue was identified involving the potential impact of a tornado on the EDGs. The EDGs are designed with a crankcase pressure trip [EIS Code PS], which is bypassed during an emergency start. A tornado could potentially cause actuation of the crankcase pressure trip due to a low barometric condition. If an emergency start signal has not previously occurred, then during a tornado, actuation of the crankcase pressure trip would energize the shutdown relay causing an EDG lockout condition. The EDG lockout condition prevents subsequent EDG starts (normal or emergency) until operators manually reset the lockout condition locally at the EDG. This condition places both units in an unanalyzed condition that potentially significantly degrades plant safety and could potentially affect all four EDGs simultaneously.

##### B. Status of structures, components, or systems that were inoperable at the start of the event and contributed to the event:

No inoperable structures, components, or systems contributed to this event.

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**NARRATIVE**

## C. Dates and approximate times of occurrences:

| Date/Time (EDT)          | Description   |
|--------------------------|---|
| May 16, 2016 at 2105 EDT | SQN determined that a tornado could potentially cause failure of the EDG building fire dampers.   |
| May 16, 2016 at 2217 EDT | An 8-hour non-emergency notification was made to the NRC to report the event as an unanalyzed condition that significantly degrades plant safety per 10 CFR 50.72(b)(3)(ii)(B). |
| June 8, 2016 at 1526 EDT | SQN determined that a tornado could potentially cause actuation of the EDG crankcase pressure trip.   |
| June 8, 2016 at 1710 EDT | An 8-hour non-emergency notification was made to the NRC to report the event as an unanalyzed condition that significantly degrades plant safety per 10 CFR 50.72(b)(3)(ii)(B). |

## D. Manufacturer and model number of each component that failed during the event:

There were no component failures.

## E. Other systems or secondary functions affected:

There were no other systems or secondary functions affected by this event.

## F. Method of discovery of each component or system failure or procedural error:

The unanalyzed conditions were discovered as a result of questions asked during the NRC Component Design Bases Inspection.

## G. The failure mode, mechanism, and effect of each failed component, if known:

There were no component failures.

## H. Operator actions:

Upon determination of each unanalyzed condition, operators promptly made NRC notifications.

## I. Automatically and manually initiated safety system responses:

There were no automatic or manual system responses associated with this event.

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**NARRATIVE****II. CAUSE OF THE EVENT**

- A. The cause of each component or system failure or personnel error, if known:

The apparent cause of these events is still under investigation. When the final investigation is completed, a supplement to this LER will be provided.

- B. The cause(s) and circumstances for each human performance related root cause:

The apparent cause of these events is still under investigation. When the final investigation is completed, a supplement to this LER will be provided.

**IV. ANALYSIS OF THE EVENT**

All 4 EDGs are required to be operable by both units' Technical Specifications to provide electrical power to safe shutdown/safety related equipment following accident conditions coincident with a loss of offsite power. The Current Licensing Basis (CLB) requires that tornado effects be considered in the design of safety related structures, systems, and components. It could not be demonstrated at the time of the events that the fire dampers and crankcase pressure switches would withstand the design basis tornado.

The EDGs are operable, but degraded and have successfully passed their required surveillances within the appropriate frequency. The occurrence of such an event involving failure of the fire dampers or the crankcase pressure switches is highly unlikely and there was no imminent concern regarding severe weather involving tornadoes.

In order to prevent any operability issues with the EDG due to tornado damage to the EDG building or components, compensatory measures have been developed to address the associated nonconformance. These compensatory measures will be accomplished by physically blocking open the fire dampers, and removing an access port downstream of one of each pair of the EDG exhaust fan dampers. It will be implemented promptly upon site notification of a Tornado Watch or Warning. A compensatory measure has also been established, that upon notification of a Tornado Warning, the EDGs will be emergency started and operated during the time the Tornado Warning is in effect to bypass the crankcase pressure trip function and allow the EDGs to be able to perform their required safety function.

**V. ASSESSMENT OF SAFETY CONSEQUENCES**

The EDGs are located inside the power plant structure and are capable of performing their safety function. The occurrence of such an event involving failure of the fire dampers or the crankcase pressure switches is highly unlikely and there was no imminent concern regarding severe weather involving tornadoes at the time of the events.

A preliminary risk assessment has been completed and has determined that the change in core damage frequency is less than 1E-6 for failures of both the EDG fire dampers and crankcase pressure switches, which is of very low safety significance. If this information

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**NARRATIVE**

changes, it will be included in the supplement to this LER.

- A. Availability of systems or components that could have performed the same function as the components and systems that failed during the event:

There were no component failures.

- B. For events that occurred when the reactor was shut down, availability of systems or components needed to shutdown the reactor and maintain safe shutdown conditions, remove residual heat, control the release of radioactive material, or mitigate the consequences of an accident:

These events did not occur when the reactor was shutdown.

- C. For failure that rendered a train of a safety system inoperable, an estimate of the elapsed time from discovery of the failure until the train was returned to service:

With the compensatory measures in place, the EDGs will remain capable of fulfilling their design basis function following a tornado.

**VI. CORRECTIVE ACTIONS**

This event was entered into the Tennessee Valley Authority Corrective Action Program under Condition Reports (CR) 1170545, 1178891, and 1181710.

- A. Immediate Corrective Actions:

8-hour non-emergency notifications were made to the NRC to report the events as unanalyzed conditions that significantly degrade plant safety per 10 CFR 50.72(b)(3)(ii)(B).

- B. Corrective actions to reduce probability of similar events occurring in the future:

Corrective actions include establishing compensatory measures to block the fire dampers in the open position in the event that a Tornado Watch/Warning is issued for the Hamilton County, Tennessee area. In addition, a compensatory measure has been established, that upon notification of a Tornado Warning, the EDGs will be emergency started and operated during the time the Tornado Warning is in effect to bypass the crankcase pressure trip function and allow the EDGs to perform their required safety function.

Further corrective actions will be addressed in the supplement to this LER after the apparent cause evaluation is complete.

LICENSEE EVENT REPORT (LER)  
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## NARRATIVE

## VII. ADDITIONAL INFORMATION

## A. Previous similar events at the same plant:

There have been no similar events at SQN in the past three years that resulted in an unanalyzed condition on the EDGs due to a tornado.

## B. Additional Information:

None.

## C. Safety System Functional Failure Consideration:

These events did not result in a safety system functional failure in accordance with 10 CFR 50.73(a)(2)(v).

## D. Scrams with Complications Consideration:

There were no scrams associated with these events.

## VIII. COMMITMENTS

None.