NRC FORM 366 (6-1998) U.S.NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104 EXPIRES: 06/30/2001

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LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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TITLE (4)

CONCRETE DEGRADATION FOUND IN DIESEL GENERATOR EXHAUST BARRIERS

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 NAME	DOCKET NUMBER
1	7	1998	1998	001	02	10	13	1998	VEGP – UNIT 2	0 5 0 0 0 4 2 5
									FACILITY NAME	0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
POWER LEVEL (10)	1 0 0	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)
		20.2203(a)(1)	20.2203(a)(3)(i)	50.73(a)(2)(ii)	50.73(a)(2)(x)
		20.2203(a)(2)(i)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71
		20.2203(a)(2)(ii)	20.2203(a)(4)	50.73(a)(2)(iv)	X OTHER
		20.2203(a)(2)(iii)	50.36(c)(1)	50.73(a)(2)(v)	*Specify in Abstract below*
		20.2203(a)(2)(iv)	50.36(c)(2)	50.73(a)(2)(vii)	*or in NRC Form 366A*

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (include area code)
Mehdi Sheibani, Nuclear Safety and Compliance	7 0 6 - 8 2 6 - 3 2 0 9

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-space typewritten lines) (16)

This report is being submitted voluntarily to advise of the discovery of an unusual condition.

On January 7, 1998, personnel were attempting to find a suspected exhaust leak where the diesel generator (DG) 1A exhaust pipe exits the roof of the DG building. On the roof of the building, personnel discovered concrete damage to the DG 1A and DG 1B exhaust pipe concrete barriers (design basis missile protection). Concrete had spalled off the inside of the barrier in several locations, exposing the rebar in some areas. In addition, extensive surface cracks were seen on both the interior and exterior of the barrier. The control room and the system engineer were notified of the condition. A preliminary evaluation determined that this degradation had no immediate impact on DG operability. Further investigation on January 14, 1998, by a civil design engineer, confirmed the degraded concrete condition previously identified. Additional inspections by plant personnel on January 21, 1998, found similar degraded barriers on the two Unit 2 DGs. Follow-up evaluations utilizing design engineering input also found no adverse impact to continued DG operability. Concrete debris was removed from exhaust piping on all four DGs. The cause of this event was found to be the differential rate of expansion and contraction between the concrete and the rebar resulting in the concrete cracking and spalling. A new design, consisting of an exhaust extension with steel guard pipe, will be implemented by November 15, 1998.

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

A. REQUIREMENT FOR REPORT

This report is being submitted voluntarily to advise of the discovery of an unusual condition.

B. UNIT STATUS AT THE TIME OF THIS EVENT

At the time of the discovery of this event, both Unit 1 and Unit 2 were operating in Mode 1 (power operation) at 100 percent of rated thermal power. Other than that described herein, there was no inoperable equipment that contributed to the occurrence of this event.

C. DESCRIPTION OF EVENT

On January 7, 1998, personnel were attempting to find a suspected exhaust leak where the diesel generator (DG) 1A exhaust pipe exits the roof of the DG building. On the roof of the building, personnel discovered concrete damage to the DG 1A and DG 1B exhaust pipe concrete barriers (design basis missile protection). Concrete had spalled off the inside of the barrier in several locations, exposing the rebar in some areas. In addition, extensive surface cracks were seen on both the interior and exterior of the barrier. The control room and the system engineer were notified of the condition. A preliminary evaluation determined that this degradation had no immediate impact on DG operability. Further investigation on January 14, 1998, by a civil design engineer, confirmed the degraded concrete condition previously identified. Additional inspections by plant personnel on January 21, 1998, found similar degraded barriers on the two Unit 2 DGs. Follow-up evaluations utilizing design engineering input also found no adverse impact to continued DG operability. Concrete debris was removed from exhaust piping on all four DGs. A review of the problem for causes and corrective actions was initiated.

D. CAUSE OF EVENT

A review found the cause of the event to be an inadequate design. The heat of the DG exhaust, followed by the subsequent cooldowns, caused both the barrier concrete and its rebar to expand and contract during DG operating cycles. However, inadequate design consideration for the differential rate of expansion and contraction between the concrete and the rebar resulted in concrete cracking and spalling as described herein.

E. ANALYSIS OF EVENT

The purpose of the DG exhaust barrier is to prevent a design basis missile from impinging directly on the DG exhaust piping and damaging the piping to the extent that the DG would no longer be able to perform its intended safety function. In the current degraded condition, the ability to withstand a missile has been compromised. It is reasonable to assume that in the barriers' degraded condition, a design basis missile will result in additional spalling of the concrete shield and probable penetration of the barrier. While the barriers probably cannot withstand a design basis missile without further degradation, it is our engineering judgment that the barriers will not collapse onto the exhaust pipe in the event of a design basis earthquake.

While the barriers are no longer capable of performing as designed, the DGs are capable of performing as designed under all design basis accident scenarios including a design basis missile directly impacting on the barrier. Even in that unlikely event, the DG will be able to perform its intended function for at least some period of time as explained below.

The DGs have 42" diameter exhaust piping. This pipe runs from the barrier at elevation 280'-0" on the roof of the DG building, to the exhaust silencer located in a dedicated room on elevation 255'-0" of the DG building, and proceeds to the diesel engine at elevation 220'-0". From the barrier, the exhaust piping turns 90 degrees prior to entering the silencer. Should a missile strike the degraded barrier, the worst case scenario would confine damage to the exhaust barrier. This damage will be limited to either partial blockage of the exhaust flow by the missile and any concrete carried by the missile, or perforation of the exhaust piping resulting in the exhaust discharging into the silencer room, or both. An evaluation assumed that blockage created by the missile and loose concrete would obscure less than 12 percent of the 42" diameter pipe opening. A review of exhaust requirements shows that a 12 percent blockage will not impact diesel performance. Our evaluation also indicates that high silencer room temperatures will not prevent diesel operation, at least in the short term, because it is believed that one time exposure to high exhaust temperatures will not result in the immediate failure of concrete in the silencer room. Under either scenario, it is our judgment that the diesel generator will perform its intended function for this design basis missile impact event.

A probabilistic risk assessment for each unit, for a six-month period, determined that the probability of either exhaust barrier being hit by a missile and collapsing is approximately 1.33E-7. The core damage probability (CDP) for a six-month period is 1.33E-8 (which assumes that the other DG would fail with an estimated probability of 0.1). Based on the Vogtle IPE model, no station

blackout scenario results in a large early release. Therefore, the change in large early release probability (LERP) due to this type of event is zero.

The PSA Application Guide Criteria for a temporary change in CDP and LERP classifies changes less than 1E-6 and 1E-7, respectively, as non-risk significant. Therefore, the impact to DG performance due to a design missile event would also be considered non-risk significant with respect to change in CDP and LERP.

The degradation identified by the inspection has obviously been occurring over an extended period of time. Debris found in the exhaust piping had not impacted diesel performance. This is evidenced by all diesel generators successfully completing their Technical Specification required monthly surveillance. Also, both Unit 1 DGs successfully completed their 24-hour runs following the Fall 1997 outage. These surveillances provide positive assurance that any debris in the exhaust piping would not have prevented the diesel generators from delivering its rated output of 7000 kW. Therefore, since the system continues to perform its functional goal, this does not represent a condition outside of the design basis as defined in 10 CFR 50.2. In addition, it was an unanalyzed condition, but it does not significantly compromise plant safety. Finally, it is not a condition that alone could prevent the fulfillment of the DG safety function. Based on these considerations, there was no adverse affect on plant safety or on the health and safety of the public as a result of this event.

F. CORRECTIVE ACTIONS

1) The DG exhausts were inspected and all debris was removed.

2) The long term corrective action is to remove the degraded exhaust barrier concrete structure and replace it with a steel guard pipe configuration. This new design is expected to be installed on both units by November 15, 1998.

G. ADDITIONAL INFORMATION

1) Failed Components:
   None
2) Previous Similar Events:
   None

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3) Energy Industry Identification System Code:
Diesel Generator System - EK
Diesel Generator Building - NB