

November 27, 1996

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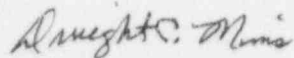
U. S. Nuclear Regulatory Commission  
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Washington, DC 20555

Subject: Arkansas Nuclear One - Unit 1  
Docket No. 50-313  
License No. DPR-51  
Licensee Event Report 50-313/96-006-01

Gentlemen:

Enclosed is the supplemental report concerning excessive water in the emergency diesel generator's fuel oil system.

Very truly yours,



Dwight C. Mims  
Director, Nuclear Safety

DCM/rhs

enclosure

050022

IE221

cc: Mr. Leonard J. Callan  
Regional Administrator  
U. S. Nuclear Regulatory Commission  
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## LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

Arkansas Nuclear One - Unit 1

DOCKET NUMBER (2)

05000313

PAGE (3)

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TITLE (4) Both Emergency Diesel Generators Inoperable Due To Excessive Water in The fuel Oil System Which Resulted From An Inadequate Sampling Of The Diesel Fuel Oil Bulk Storage Tank

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 ANO-2	DOCKET NUMBER
05	27	96	96	006	01	11	27	96	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9)		N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (Check one or more) (11)							
POWER LEVEL (10)		100	20.402(b)		20.405(c)		50.73(a)(2)(iv)		70.71(b)	
			20.405(a)(1)(i)		50.36(c)(1)		X 50.73(a)(2)(v)		70.71(c)	
			20.405(a)(1)(ii)		50.36(c)(2)		X 50.73(a)(2)(vii)		OTHER	
			20.405(a)(1)(iii)		X 50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		Specify in	
			20.405(a)(1)(iv)		X 50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		Abstract Below	
			20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)		and in Text	

## LICENSEE CONTACT FOR THIS LER (12)

NAME

Richard H Scheide, Nuclear Safety and Licensing Specialist

TELEPHONE NUMBER (Include Area Code)

501-858-4618

## 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		NO		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
(If yes, complete EXPECTED SUBMISSION DATE)		X					

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

At 1550, on May 27, ANO-1 entered the seven day action statement of TS 3.7.2.c when a sample from the fuel oil storage tank (T-57A) for the K4A EDG was verified to contain above the TS limit of 0.05 percent water and sediment. A sample taken from the storage tank (T-57B) for the K4B EDG also indicated high water content and TS 3.0.3 was entered at 1958. A plant shutdown was initiated at 2054. T-57A and T-57B were partially drained several times to remove the accumulated water and return them to within TS limits. At 2223, following two consecutive samples from T-57B that were less than 0.05 percent water and sediment, K4B was declared operable and TS 3.0.3 was exited. Power reduction was terminated at 95 percent. TS 3.7.2.c was exited at 2015 on May 28, after returning K4A to an operable status. The source of the water was T-25, the non-essential bulk storage tank for all site diesels. Condensation in the tank and small amounts of water delivered in transports accumulated in the bottom of the tank over time. The cause of the condition was the failure to consider the tank construction when implementing procedures for fuel oil sampling. This resulted in not sampling from the bottom of T-25. Corrective actions include a procedure revision to require sampling from the bottom of T-25 and implementation of a quarterly drain from the bottom of the tank. A qualitative analysis was completed which determined that the amount of water in the fuel oil system was not sufficient to prevent the EDGs from performing their design function.

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

#### A. Plant Status

At the time this condition was identified, Arkansas Nuclear One Unit-1 (ANO-1) was operating at approximately 100 percent power with Reactor Coolant System (RCS)[AB] pressure at 2155 psig and RCS temperature at 579 degrees. ANO-2 was operating at 98 percent power with RCS pressure at 2200 psia and temperature at 572 degrees.

#### B. Event Description

At 1958 on May 27, 1996, ANO-1 entered Technical Specifications 3.0.3 as a result of both Emergency Diesel Generators (EDGs) being declared inoperable due to an unacceptable concentration of water and sediment in the EDG fuel oil storage system.

The diesel generator fuel oil storage and transfer system is designed to provide an independent source of fuel oil for each of the EDGs. Each EDG is supplied fuel oil by a Seismic Class I source consisting of a 22,500 gallon underground fuel oil storage tank (T-57A/B), a 550 gallon fuel oil day tank (T-30A/B), and a fuel oil transfer pump and associated piping. An above ground 185,000 gallon bulk storage tank (T-25) feeds the safety related fuel oil systems for the EDGs of both ANO units as well as other site diesels and the startup boiler. Because T-25 is not an essential fuel supply to the EDGs, it is not designed to tornado, flood, or single failure criteria. T-25 is designed with a crowned bottom to allow water and sediment to settle at the periphery of the tank. The nozzle supplying the EDG storage tanks is located approximately three inches from the bottom of the tank to preclude water from getting into the EDG fuel oil system. The isolation valves from the bulk storage tank to the EDG storage tanks are normally locked open to provide a continuous gravity feed supply of fuel to the EDG storage tanks.

ANO-1 Technical Specification 4.6.1.4.e states that "diesel fuel from the emergency diesel storage tank shall be sampled and found to be within acceptable limits specified in Table 1 of ASTM D975-68 when checked for viscosity, water, and sediment." The ASTM limit for water and sediment is 0.05 percent.

On May 27, during the monthly EDG surveillance, a fuel oil sample collected from T-57A at 1350 indicated a water content of 1.4 percent. A confirmatory sample was collected which indicated a water content of 0.8 percent. The Control Room was notified of the condition at 1550, at which time the K4A EDG was declared inoperable and the seven day action statement of Technical Specification 3.7.2.c was entered.

A fuel oil sample was then collected from T-57B and found to contain 0.3 percent water. At 1958, after confirming that the analysis was correct, the K4B EDG was declared inoperable and Technical Specification 3.0.3 was entered. A plant shutdown was initiated at 2054.

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The EDG day tanks were sampled and found to contain no water or sediment. Approximately 157 gallons of fuel oil was drained from T-57A and T-57B in the process of returning them to within Technical Specifications limits. At 2223, following two consecutive samples from T-57B and a sample from T-30B that were less than 0.05 percent water, the K4B EDG was declared operable and Technical Specification 3.0.3 was exited. Power reduction was terminated at 95 percent.

Approximately 200 gallons of fuel oil was drained from T-30A to ensure that all of the water was removed from the transfer piping between T-57A and T-30A. The post drain sample results showed no water or sediment in either tank. At 2015, on May 28, after successful completion of a surveillance run on K4A, it was declared operable and the seven day action of specification 3.7.2.c. was exited.

This condition impacted ANO-2 as well, but only to the extent of affecting one of the ANO-2 EDGs. Initial sampling of 2T-57A indicated no water content. However, a second sample was collected after draining approximately fifty gallons from the tank which indicated a water content of 0.075 percent water and sediment. Although this value was below the vendor technical manual maximum for water and sediment of 0.1 percent, it was greater than the TS limit of 0.05 percent. Therefore, the 2K4A EDG was declared inoperable at 2224 on May 27, and the action statement of Technical Specification 3.8.1.1.b was entered. Samples were collected from 2T-57B, 2T-30B, and 2T-30A and found to contain no water and sediment. Approximately 200 gallons of fuel oil was drained from the bottom of 2T-57A to remove the water. The 2K4A EDG was declared operable and the action statement of Technical Specification 3.8.1.1.b was exited at 1115 on May 28, after samples consistently showed a water and sediment content less than 0.05 percent. The root cause and corrective actions address ANO-2 to the same degree as ANO-1.

### C. Root Cause

The source of the water contamination in the fuel oil storage system was identified to be the bulk storage tank, T-25. The two most likely ways for water to get into T-25 are by condensation on the tank walls and through accumulation over a long period of time of small amounts of water in fuel oil delivered by truck.

T-25 is an above ground tank that is vented to atmosphere. Moist air entering the tank through the vent can result in the formation of condensate on the tank walls which will eventually settle to the bottom of the tank.

All transports that deliver fuel oil to ANO are sampled at the top, middle, and bottom for water and sediment content prior to offloading. If water and sediment is above 0.05 percent, the fuel is rejected. However, it is possible that small amounts of water may be transferred to T-25 from these transports.



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The T-57 and T-30 tanks are sampled monthly during the EDG surveillance test. The samples from these tanks are taken at or very near the bottom of the tanks, providing a conservative indication of water content. T-25 is sampled quarterly from the top of a filter located in the line between T-25 and the EDG fuel oil storage tanks. This sample is not indicative of water and sediment content at the bottom of the tank since the supply nozzle in T-25 is approximately three inches from the bottom of the tank.

The construction of T-25 was not considered when its sampling point was proceduralized. As a result of this error, the water and sediment accumulation in the bottom of T-25 went undetected until it entered the EDG storage tanks. If T-25 had been sampled from the bottom, water and sediment would have been identified and drained from the tank before it reached the level of the supply nozzle.

**D. Corrective Actions**

T-25 was drained, cleaned, and inspected.

The height of the nozzles in the bottom of T-25 were increased six inches to provide additional margin before water and sediment carryover can occur.

Procedures were revised to require sampling T-25 from the bottom of the tank.

Controls were established to require draining from the bottom of the tank quarterly to remove accumulated water and sediment.

The methodology of sampling and testing diesel transports delivering fuel oil to ANO was evaluated and determined to be adequate to verify the quality of the fuel oil.

**E. Safety Significance**

Sampling records verify that the water carryover condition of T-25 did not exist for an extended period of time. The T-30 and T-57 tanks are sampled monthly during the EDG surveillance. In fact, the K4A EDG was running at the time the contaminated sample was taken from T-57A. The previous month's surveillances indicated no water in any of these tanks. In addition, T-30A/B, 2T-30A/B, 2T-57B, and the station blackout diesel day tank and transfer piping were sampled during this event and contained no water and sediment. After identification, the condition was expeditiously corrected. One of the ANO-1 EDGs was returned to an operable status two hours and twenty-five minutes after entering Technical Specification 3.0.3 and both ANO-1 EDGs were restored to an operable status within twenty-eight hours and twenty-five minutes of the initial entrance into Technical Specification 3.7.2.c.

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A qualitative analysis was performed by ANO to determine the potential effect of the water found in the diesel fuel oil system on the ability of the EDGs to perform their design function.

Since the fuel oil sample points are located in tank low points where water/sediment tends to concentrate, sample results are not indicative of the actual fuel oil water/sediment content of the tank. However, the analysis assumed that the entire volume of water drained from or passed through the system from the time of the initial sample until the tanks were returned to within specifications contained the percentage of water and sediment indicated in the results of the initial sample. That amount of water was then assumed to be transferred to the applicable fuel oil day tank (T-30A, B) and the resultant concentration's affect on the ability of the associated EDG to perform its design function was evaluated.

K4A was running at the time of the initial sample, which indicated a water/sediment concentration of 1.4%. During the surveillance run, K4A consumed approximately 400 gallons of fuel oil. Another 6 gallons of fuel oil was drained before a sample indicated 0.0% water/sediment. If it is assumed that the entire 406 gallons of fuel oil contained 1.4% water/sediment and that all of the water/sediment was transferred to T-30A, that tank would contain 2.07% water/sediment, rendering K4A inoperable. However, the functionality of K4A was proven in that it successfully ran fully loaded for its entire surveillance run and samples from T-30A showed no water/sediment content.

K4B was run for approximately 10 minutes after K4A was declared inoperable. After the run, EDG fuel oil storage tank (T-57B) was sampled. The results of that sample indicated a water/sediment content of 0.3%. After draining 50 gallons of fuel oil from the tank, a subsequent sample indicated 0.0% water/sediment. To assess the potential effects of this condition, it was conservatively assumed that the entire 50 gallons contained 0.3% water/sediment and that amount of water would be transferred to T-30B during an EDG run. (Sampling of this tank showed no water was actually present) The resultant water/sediment concentration in T-30B was calculated to be 0.05%, which is within the manufacturers and the Technical Specifications operability limits. Therefore, it can be concluded that K4B remained capable of performing its design function if it had been called upon to do so while there was water in its fuel oil system.

It can be concluded from the above information that the water actually present in the EDG fuel oil system was limited to a small quantity at the bottom of the tanks and in the sample lines which was not sufficient to prevent the EDGs from performing their design function. Therefore, this condition is considered to be of low safety significance.

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**F. Basis for Reportability**

Entry into Technical Specification 3.0.3 is reportable pursuant to 10CFR50.73(a)(2)(i)(B). This event represented a single condition that had the potential to render two independent trains of the EDGs inoperable, thus preventing the fulfillment of their safety function. Therefore, it is also reportable under 50.73(a)(2)(ii)(B), (a)(2)(v)(A), and (a)(2)(vii)(A).

**G. Additional Information**

A event occurred at ANO in 1986 (see LER 2-86-014-01) in which an EDG was rendered inoperable due to filter blockage resulting from sludge accumulation. As a result of that event, a more detailed fuel oil sampling and analysis program was established. The corrective actions taken with respect to that event did not prevent the event discussed in this report because the construction of T-25 was not considered when the sampling locations were established.

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].