



**Entergy  
Operations**

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May 19, 1992

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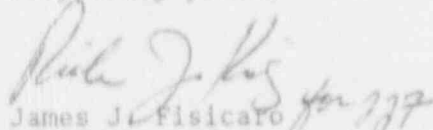
U. S. Nuclear Regulatory Commission  
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SUBJECT: Arkansas Nuclear One - Unit 2  
Docket No. 50-368  
License No. NPF-6  
Licensee Event Report 50-368/92-004-00

Gentlemen:

In accordance with 10CFR50.73(a)(2)(i)(B) enclosed is the subject report concerning emergency diesel generator fuel oil.

Very truly yours,

  
James J. Fiscaro  
Director, Licensing

J.F/TFS/mmg

Enclosure

cc: Regional Administrator  
Region IV  
U. S. Nuclear Regulatory Commission  
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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Arkansas Nuclear One, Unit Two DOCKET NUMBER (2) 050003681 OF 06  
PAGE (3)

TITLE (4) Foreign Material In Emergency Diesel Generator Fuel Oil Day Tank Due To Cleanliness Control  
Deficiencies Resulted In Operation Prohibited By Technical Specifications

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)
04	24	92	92	004	00	05	19	92		050003681

OPERATING MODE (9) 5 THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)

POWER LEVEL (10)	20.402(b)	20.405(a)(1)(i)	20.405(a)(1)(ii)	20.405(a)(1)(iii)	20.405(a)(1)(iv)	20.405(a)(1)(v)	20.405(c)	50.36(c)(1)	50.36(c)(2)	50.73(a)(2)(i)	50.73(a)(2)(ii)	50.73(a)(2)(iii)	50.73(a)(2)(iv)	50.73(a)(2)(v)	50.73(a)(2)(vi)	50.73(a)(2)(vii)	50.73(a)(2)(viii)(A)	50.73(a)(2)(viii)(B)	50.73(a)(2)(ix)	73.71(b)	73.71(c)	Other (Specify in Abstract below and in Text, NRC Form 366A)	
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LICENSEE CONTACT FOR THIS LER (12)

Name: Thomas F. Scott, Nuclear Safety and Licensing Specialist  
Telephone Number: 501964-5000  
Area Code: 501

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

Cause	System	Component	Manufacturer	Reportable to NRC	Cause	System	Component	Manufacturer	Reportable to NRC

SUPPLEMENT REPORT EXPECTED (14)

Yes (If yes, complete Expected Submission Date)  No  
EXPECTED SUBMISSION DATE (15)

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

During routine surveillance testing of "A" Emergency Diesel Generator on April 12, 1992, the engine became incapable of supplying full load because of reduced fuel oil header pressure. Subsequent investigation revealed blockage of the suction strainer of the foot valve in the fuel oil day tank by a fibrous material. Laboratory analysis confirmed that the material was from an oil absorber only used in cleaning oil pills. On April 24, 1992 sufficient information had been generated to allow concluding that the engine could have been in a degraded condition, i.e., not capable of maintaining full load for the duration of a design basis accident. This caused the engine to be declared inoperable during previous periods and, since appropriate actions had not been taken, resulted in operation prohibited by Technical Specifications. A review of previous maintenance activities revealed that the foreign material probably entered the system in October of 1991 during cleaning of the fuel oil transfer pump suction strainer due to inadequate cleanliness and foreign material exclusion controls. The fuel oil system for the other Emergency Diesel Generator was inspected with no similar material being found. The event is being reviewed with appropriate personnel. Corrective actions also include documentation revisions to strengthen cleanliness control requirements as well as a review of the foreign material exclusion program for maintenance activities.

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

A. Plant Status

At the time this condition was discovered, Arkansas Nuclear One Unit 2 (ANO-2) was in cold shutdown conditions (Mode 5) with Reactor Coolant System (RCS) [AB] temperature 85 degrees and pressure 15 psia.

B. Event Description

During a root cause evaluation of a problem with fuel oil [DC] supply to "A" Emergency Diesel Generator (EDG) [EK], on April 24, 1992 sufficient information was available to determine that the EDG may not have been capable of operation at full load for a period of time required to fulfill its function during a Design basis accident.

On April 12, 1992 at 0931 "A" EDG was started for its monthly surveillance test. Approximately forty minutes into the performance of this test the operator stationed at the EDG noticed that fuel oil header pressure to the engine had decreased to 2.5 psig. This is below the minimum value of 10 psig specified on the log sheet. Swapping the duplex fuel oil filter had no effect on fuel oil pressure. Load on the generator began to oscillate as much as 200 KW. When the load was decreased to 1400 KW, fuel oil pressure to the engine returned to approximately 17 psig. The engine operated normally at this point. Approximately forty minutes later the generator load was gradually increased to 2000 KW. Fuel oil pressure decreased to 10 psig. Increasing load to 2500 KW resulted in fuel oil pressure dropping to 5 psig. During this load increase no other abnormalities or obvious reasons for the drop in fuel oil pressure were noted by Operations or Maintenance personnel. The engine was shutdown and troubleshooting efforts began. The EDG was declared inoperable at 1020 on April 12, 1992. "B" EDG was operable at this time.

Subsequent tests and inspections indicated blockage to the suction of the fuel oil pump. On April 15, 1992 the EDG Fuel Oil Day Tank, 2T-30A, was opened for inspection. The foot valve, 2ED-7A, was found to be clogged with a fibrous material. This material, a collection of small pieces, was fairly evenly distributed on the brass wire mesh strainer that covers the opening of the foot valve suction. The material was approximately 1/16 to 1/8 inch thick over the strainer surface and was estimated to total approximately 1.75 cubic inches. The strainer had partially collapsed into the foot valve housing which allowed some of the material to enter the foot valve itself. A sample of the material was sent to a laboratory for analysis. It was determined to be part of an oil absorber sheet only used in cleaning oil spills.

The Fuel Oil Day Tank for the other EDG was inspected. A slight amount of sludge was found in the tank and on the foot valve screen but no oil absorber material was present. This sludge was removed prior to closing the tank.

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Maintenance records were reviewed in an attempt to determine when and how the material got into the fuel oil system. Four instances when the system was opened were evaluated.

1. The Fuel Oil Storage Tank (2T-57A) manway was removed to repair a leak on March 31, 1991. A review of the job order revealed that there were no oil absorbers used for this work. If an oil absorber fragment had been dropped into the tank at that time, it is unlikely that it would have taken twelve months to be sucked into the fuel oil transfer pump and sent to the fuel oil Day Tank. Also, any material would have had to pass through the fuel oil transfer pump suction strainer (2F-36A) to get to the day tank. This is unlikely due to the mesh of the strainer. Also an inspection of the strainer following the April 1992 event did not reveal any foreign material.
2. In March of 1991, during the last refueling outage, the day tank was opened and cleaned. Level switches were removed from the tank for calibration. A review of job orders revealed that no oil absorbers were requisitioned for either task. Prior to final closure, the tank was inspected for cleanliness. This inspection was done with low illumination in the tank that could have contributed to missing foreign material. If the foreign material had been introduced into the tank at that time it would have had to be overlooked by the craftsmen and two independent cleanliness inspectors and have remained in the system for one year before clogging the day tank strainer.
3. On October 25, 1991 the fuel oil transfer pump suction strainer was removed for cleaning. Oil absorbers were used for this job. Statements from two individuals involved in this work revealed that the oil absorbers were only used to soak up fuel oil that had been spilled on the floor. Only lint-free rags were used to clean the strainer housing. The strainer itself was replaced with a new strainer. System cleanliness was not independently verified prior to reassembly.
4. A filtering of the contents of 2T-57B started on April 7, 1992. This procedure uses temporary hoses to circulate oil from Storage Tank 2T-57B through a filter and back to a bulk storage tank supplying both 2T-57A and B. Oil absorbers were used for this job; however, the fuel passed through a five micron filter between the bulk storage tank and either 2T-57A or B. Any debris would also have had to pass through the fuel oil transfer pump suction strainer in order to reach the day tank.

Since oil absorber sheets were used for cleaning an oil spill during the October 25, 1991 maintenance (number 3 above), this is considered the most likely time when foreign material was introduced into the system. Also, the condition of the material indicated that it may have been shredded in some way

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for it to evenly distribute itself around the foot valve strainer. If the material entered at the strainer it would have passed through the fuel oil transfer pump prior to reaching the day tank. Passing through the pump would have most likely shredded the material. However, the possibility of entry of the material during the March 1991 day tank cleaning cannot be completely eliminated.

A review of past fuel oil pump discharge pressure data revealed no degrading trends. At the start of the failed run the pressure was a normal 22 psig at full load and decreased throughout the run.

C. Root Cause

The root cause for foreign material having entered the EDG fuel oil system is attributed to inadequate cleanliness and foreign material exclusion controls.

D. Corrective Actions

The foot valve in fuel oil day tank 2T-30A was removed and cleaned. The tank internals were also cleaned. The fuel oil cupo filter was cleaned. The duplex fuel oil filter elements were replaced. The foot valve strainer and tank internals for 2T-30B were also inspected and cleaned. No absorber material was found. The transfer pump suction strainers for both systems were inspected with no absorber material found. Observation of the fuel oil transfer pump performance indicated that it was operating normally.

Applicability to Unit 1 was evaluated. The Unit 1 EDGs do not have foot valves inside their fuel oil day tanks and do not have manways on the day tanks that would allow material to be left in the system. Strainers in the fuel oil pump suction lines would catch any debris from the storage tanks prior to reaching the day tanks. An inspection and cleaning of Unit 1 EDG fuel oil tanks, filters and strainers was recently completed. No fibrous material was identified during these inspections.

This event will be reviewed with Unit 2 Mechanical and Instrumentation and Control Maintenance personnel, Mechanical Maintenance Planners, and Quality Control Inspectors to take advantage of lessons learned. This review will be completed by July 31, 1992.

The procedure for inspection of the fuel oil day tanks will be revised to include steps to install adequate lighting. This is expected to be complete by July 15, 1992.

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Quality Engineering will issue supplemental instructions to the Quality Control (QC) job order package reviewers to add cleanliness QC hold points or notifications in job order packages related to activities involving opening or closing either unit's EDG fuel oil system. This will be completed by June 15, 1992.

A review of surveillance procedures and repetitive tasks to ensure adequate cleanliness controls will be completed by June 30, 1992.

A complete review of the foreign material exclusion program will be completed and appropriate changes implemented by September 30, 1992.

E. Safety Significance

The two EDGs are designed to generate and supply required emergency power to redundant 4.16 KV Engineered Safety Features (ESF) buses. Each EDG is capable of carrying the maximum ESF loads required under postulated accident conditions. Even though "A" EDG had passed all required surveillance tests and shown no performance problems, it has been assumed to have been inoperable from the time of the maintenance activity on October 25, 1991 until the fuel oil problem was discovered on April 12, 1992. Based upon engineering judgement, it cannot be stated with reasonable assurance that the EDG could have carried the required load for the full duration of a design basis accident. The engine had run for approximately 66 hours since it was overhauled during the last refueling outage and for 12 hours since any portion of the system was opened for maintenance. The engine was capable of supplying partial load even with the day tank suction strainer clogged. Plant records from October 25, 1991 to April 12, 1992 were reviewed. This review showed that for plant operation above cold shutdown conditions "B" EDG was operable and in automatic standby except for short periods of routine surveillance testing and for a period of special testing on December 4, 1991 that involved approximately six hours. Redundant offsite power sources were also available above cold shutdown except when Startup Transformer #2 was removed from service for approximately four hours on November 1, 1991. During cold shutdown conditions, Technical Specification 3.8.1.2 allows both EDGs to be out of service if positive reactivity changes are suspended. "B" EDG was removed for service for approximately one hour and fifteen minutes on March 25, 1992 to obtain an oil sample. It was also removed from service for inspection for approximately 12.5 hours March 29, 1992 and between 0405 on April 6, 1992 and 0900 on April 11, 1992. During these periods, shutdown margin remained greater than -5.5 percent delta K/K. Although there were some small temperature and RCS boron concentration variations, no significant positive reactivity evolutions occurred when both EDGs may have been inoperable. Based on the limited amount of time and plant conditions under which both EDGs may have been inoperable, as well as the isolated nature and uncertainties of this condition, it is evaluated to have limited safety significance.

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F. Basis For Reportability

"A" FDG was determined to have been inoperable because it may not have been capable of fulfilling its design function during accident conditions. There were periods when "B" EDG was inoperable for other reasons. Since it was not known that "A" EDG was inoperable, the appropriate action requirements of Technical Specifications 3.8.1.1 or 3.8.1.2 were not taken for either one or both EDGs being inoperable. This represents a condition prohibited by Technical Specifications that is reportable pursuant to 10CFR50.73(a)(2)(i)(B).

G. Additional Information

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

There have been no similar events reported as Licensee Event Reports at ANO.