

## DEGRADATION OF FUEL OIL FLOW TO THE EMERGENCY DIESEL GENERATOR

### DESCRIPTION OF CIRCUMSTANCES

During surveillance testing on July 14, 1977, personnel at the Cooper Nuclear Station noted a degradation of fuel oil flow to the day tank for the emergency diesel generator. Although the fuel oil transfer pump capacity is 13.8 gpm for each of the two redundant pumps, flow to the day tank for number one diesel generator was only 3 gpm. At full load, engine consumption is 4.5 gpm.

Investigation of this occurrence revealed a clogged strainer in a float operated shutoff valve on the day tank inlet. This valve operates as a backup to level switches which start and stop the fuel oil transfer pumps to maintain normal day tank level. The strainer is an integral part of the float valve assembly and is not shown on the as-built system drawings. This valve was manufactured by McDonnell-Millen Company. Station personnel were thus unaware of the presence of this strainer and did not schedule it for routine strainer cleaning under the preventive maintenance program. Normal testing of the system under the Technical Specification surveillance requirements does not verify system flow rates.

This occurrence represents an example where the as-built system configuration was not accurately indicated on the system drawings, and that adequate system description was apparently not available to Station personnel.

All holders of construction permits or operating licenses should be aware of the potential for variance between as-built configurations and system drawings. This is especially true for support systems to the engineered safeguards features where all required system conditions such as pressure and flows may not receive routine testing under the surveillance testing program. It is recommended that the following be considered in your review of this matter:

1. A field verification of the drawing against the as-built system configuration should be made for the entire diesel generator fuel oil delivery system from the storage tanks to the engines. Appropriate changes should be made to the drawings and preventive maintenance program to account for any components or configurations not previously covered.
2. Consideration should be given to revising surveillance test procedures to include a flow test on the fuel oil system to ensure the system continues to meet design specifications.

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In addition, the following information relating to the maintenance of fuel oil cleanliness should be considered in your review:

1. During long-time storage, degradation of fuel oil is a common occurrence. The rate of degradation is not easily predicted since it is a function of the source of the crude oil, the process utilized in making the fuel (e.g., straight distillation or the method of catalytic cracking), and the conditions under which the fuel oil is stored.
2. It is known that certain detrimental processes are accelerated in fuel oils when they are in contact with certain metals. The presence of zinc, such as from galvanizing, has a tendency to form soluble soaps in the fuel oil which are deposited on the diesel engine's injection nozzles. A buildup of this deposit will eventually degrade the engine's performance. The presence of copper promotes the formation of gums which degrade the stored fuel oil and tends to clog filters.
3. The presence of water in the fuel oil promotes the growth of fungi or slime that also degrades the fuel and has the potential for clogging filters.

No written response to this Circular is required. If you require additional information regarding this matter, contact the Director of the appropriate NRC Regional Office.

Enclosure  
IE Circular 77-15  
Date: November 23, 1977

LISTING OF IE CIRCULARS ISSUED IN 1977

CIRCULAR NO.	SUBJECT	FIRST DATE OF ISSUE	ISSUED TO
77-01	Malfunctions of Limitorque Valve Operators	1-4-77	All holders of OLs or CPs
77-02	Potential Heavy Spring Flooding	2-15-77	All affected holders of OLs
77-02A	Potential Heavy Spring Flooding	2-16-77	All affected holders of CPs
77-03	Fire Inside a Motor Control Center	2-28-77	All holders of OLs and CPs
77-04	Inadequate Lock Assemblies	3-17-77	Safeguard Group I, II, IV, V, Licensees
77-05	Liquid Entrapment in Valve Bonnets	3-24-77	All holders of OLs and CPs
77-06	Effects of Hydraulic Fluid on Electrical Cable	4-1-77	All holders of OL's and CPs
77-07	Short Period During Reactor Startup	4-12-77	Holders of BWR OLs
77-08	Failure of Feedwater Sample Probe	4-13-77	All holders of OLs
77-09	Improper Fuse Coordination In BWR Standby Liquid Control System Control Circuits	5-25-77	All holders of BWR OLs or CPs
77-10	Vacuum Conditions Resulting in Damage to Liquid Process Tanks	7-15-77	All holders of OLs

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LISTING OF IE CIRCULARS ISSUED IN 1977 (Continued)

CIRCULAR NO.	SUBJECT	FIRST DATE OF ISSUE	ISSUED TO
77-11	Leakage of Con- tainment Isolation Valves with Resilient Seats	9-6-77	All holders of OLS and CPs
77-12	Dropped Fuel Assem- blies at BWR Facili- ties	9-15-77	All holders of BWR OLS or CPs
77-13	Reactor Safety Signals Negated During Testing	9-22-77	All holders of OLS and CPs
77-14	Separation of Contaminated Water Systems From Noncontaminated Plant Systems	11-22-77	All Power and Test Reactor, Fuel Cycle, and major By-product material processor facilities with OLS or CPs