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July 31, 2002

U.S. Nuclear Regulator Commission
Document Control Desk
Mail Stop 0P1-17
Washington, DC 20555

Subject: 10CFR21 Reporting of Defects and Non-Compliance -
Engine Systems, Inc. Report No. 10CFR21-0084, Rev. 0

Norgren R18 relieving style pressure regulating valves

Dear Sir:

The enclosed report addresses a reportable notification about Norgren R18 relieving style pressure regulating valves.

A copy of the report has also been sent to the NRC.

Please sign below, acknowledging receipt of this report, and return a copy to the attention of Document Control at the address above (or, fax to number 252/446-1134) within 10 working days after receipt.

Yours very truly,

ENGINE SYSTEMS, INC.

Susan Woolard
Document Control

Please let us know if ANY of your mailing information changes - name of recipient, name of company/facility, address, etc. Mark the changes on this acknowledgment form and send to us by mail or FAX to the number above.

(93)

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Report No. 10CFR21-0084
Rev. 0: July 30, 2002

10CFR21 REPORTING OF DEFECTS AND NON-COMPLIANCE

COMPONENT: Air Start System Pressure Reducing Valve, Norgren R1& Relieving

SYSTEM: EMD Emergency Diesel Generators

CONCLUSION: Reportable in accordance with 10CFR21.

Prepared By: *[Signature]*
Engineering Manager

Date: 7/30/02

Reviewed By: *[Signature]*
Quality Assurance Manager

Date: July 30, 2002

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Quality Performance With Pride

REV	DATE	PAGE	DESCRIPTION

COMPONENT:

Air Start System Pressure Reducing Valve, Norgren R18 Relieving

SUMMARY:

Engine Systems Inc. (ESI) has concluded its investigation of a condition reported with EMD air start systems utilizing Norgren R18 relieving style air pressure regulating valves. The condition identifies an occurrence wherein, following an engine start, the regulating valve sticks open allowing compressed air leakage through the relieving tube of the regulator. The problem occurs as a result of sudden high air flow through the regulator followed by an immediate termination of flow. The sudden flow demands of air cause excessive deflection of internal components resulting in the inability of the valve to properly close following the start event. As a result, the starting air pressure is ported to the relieving tube of the regulator and out to atmosphere. The valve remains in this state until the air receiver pressure drops to a value low enough to overcome the forces holding the valve open.

Two (2) sites have reported this occurrence to date:

Sequoyah Nuclear Plant

Tennessee Valley Authority – Sequoyah Nuclear Plant reported the problem occurring on one of their tandem 16x16-645E4 EMD emergency diesel generator sets. This application utilizes an air receiver pressure of 250-300 PSIG nominal. During the described event, following a start, the valve would remain open venting the starting air pressure to atmosphere. The valves would remain open until the inlet pressure dropped to approximately 175 PSIG.

First Energy – Davis-Besse Nuclear Plant

First Energy – Davis-Besse Nuclear Plant recently reported a similar occurrence on their 20-645E4 EMD emergency diesel generator sets. The Davis-Besse air receivers are charged to 225-250 PSIG. This location reported that the receiver air pressure typically had to fall to 200 PSIG before the reducing valve would close.

DISCUSSION:

C.A. Norgren Company, the manufacturer of the valve, was contacted to evaluate the condition and assist in a resolution. After evaluating the problem Norgren determined that the sudden demand in flow during an engine start caused the main valve to open further than is normally expected. When the air flow is suddenly terminated following the engine start, the resulting backpressure within the valve causes the diaphragm assembly to travel to its maximum upper position and allows its o-ring to separate from the valve tube. The relative positions of the two components causes the main valve to stick in the open position and opens the air relief path through the relieving tube of the regulator. The o-rings around the relief tube and on the diaphragm retainer in addition to the forces generated by the flow through the valve contribute to hold the valve open. As the pressure in the air receiver falls, the forces acting to hold the valve open decrease and the valve returns to its closed position. Refer to figures 1 & 2.

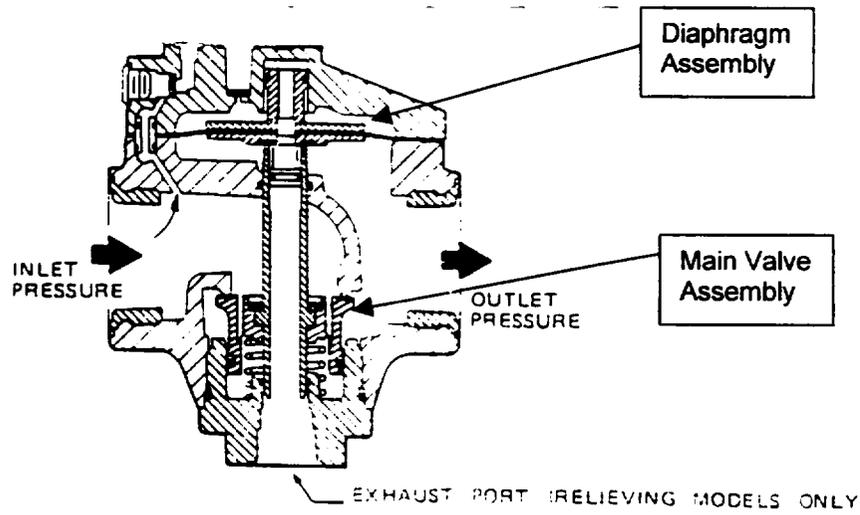


FIGURE 1
Valve Assembly with no flow

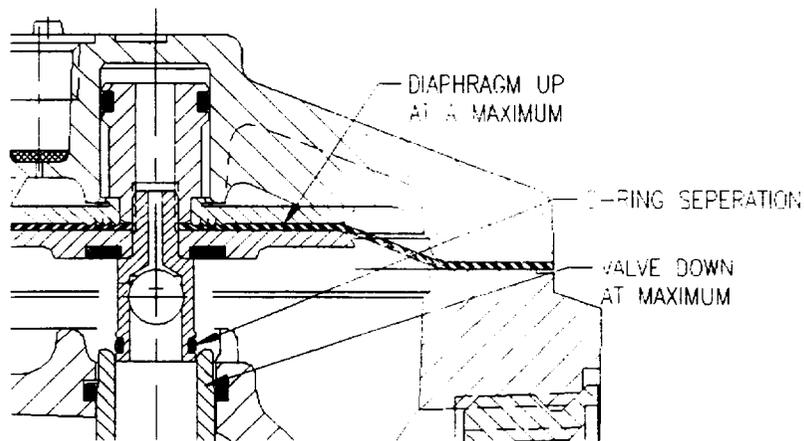


FIGURE 2
Valve Position during event

As a result of this condition, two changes were implemented for the R18 assemblies:

The first change is to a sub-component of the diaphragm assembly. As seen in Figure 2 the retainer has become separated from the relief tube during sudden backpressure situations causing a resistance to the relief tube returning to the neutral position at no flow. The retainer was extended to ensure the tube cannot come free when the valve and diaphragm are at their furthest separation. Refer to figure 3 depicting the extended retainer installed.

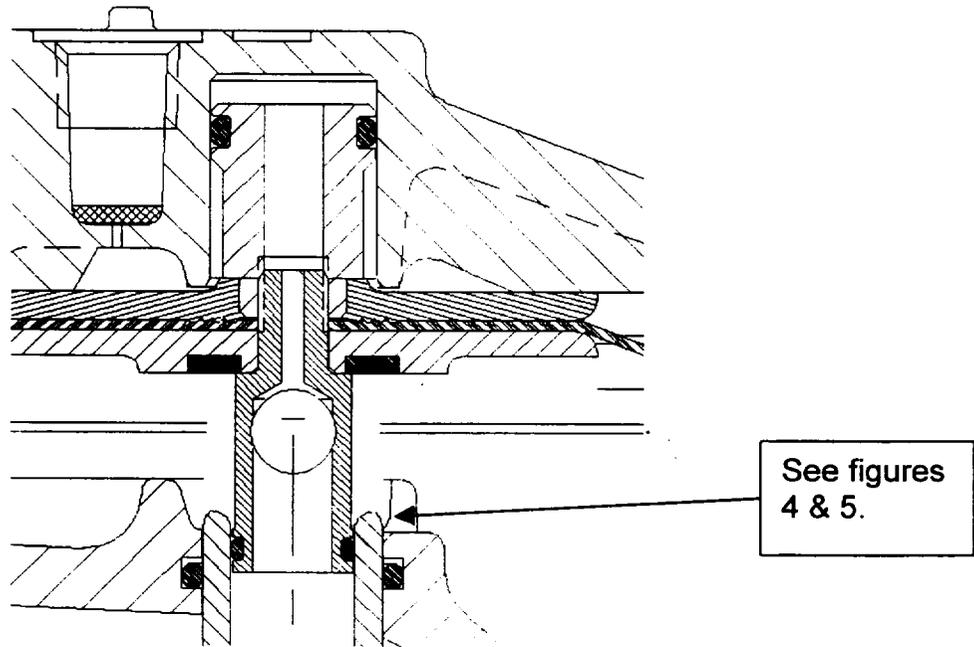


FIGURE 3
Valve with new diaphragm retainer installed

The second change is to the valve tube. As seen in Figure 4, when the valve is open at a maximum, there is room for the o-ring to start extruding from the cavity. When the relief tube tries to return to its normal position, the o-ring provides resistance. The geometry of the valve tube at the o-ring interface was modified to eliminate the smaller diameter on the tube to prevent the o-ring from extruding. Refer to figure 5.

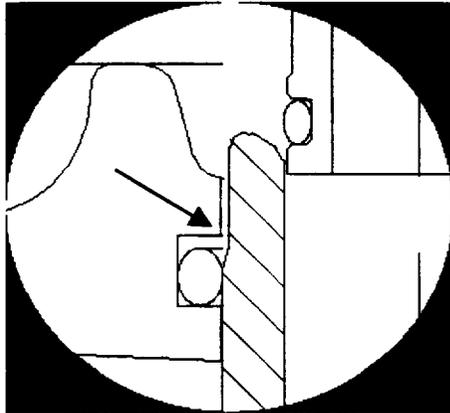


FIGURE 4
Retainer O-Ring in tube

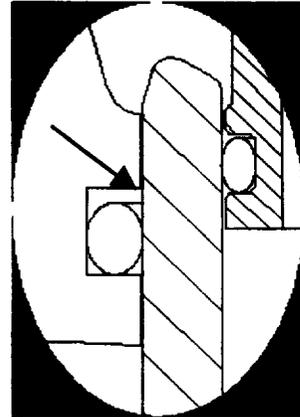


FIGURE 5
Retainer O-Ring in tube

CONCLUSION:

Norgren has implemented the above changes on all new diaphragm assemblies and valve tube assemblies supplied either individually or as part of an assembly.

Although the event would only occur following a start attempt, the ability to achieve the designed number of engine starts from a fully-charged air receiver could be compromised.

CUSTOMERS AFFECTED:

ESI has searched its historical data and has determined the following customers have purchased Norgren R18 Relieving style regulators for safety-related applications:

CUSTOMER	SITE
CFE	Laguna Verde Nuclear Plant
Commonwealth Edison	Dresden Nuclear Plant
Entergy Operations	Grand Gulf Nuclear Plant
First Energy	Davis-Besse Nuclear Plant
Knolls Atomic Power Lab	Kesselring Site
Nuclenor	Santa Maria Nuclear Plant
Portland General Electric	Trojan Nuclear Plant
Tennessee Valley Authority	Sequoyah Nuclear Plant
Tennessee Valley Authority	Watts Bar Nuclear Plant

CORRECTIVE ACTION:

Replace the valve/tube assembly and diaphragm assembly. The part number for the re-designed valve/tube assembly is 5945-60. The part number for the diaphragm assembly is 5945-61.