



## **Technical Bulletin / Safety Alert**

**Unique ID No:** DES2007-TBSA-03

**Rev:** 0

(This document supersedes all previous versions of the above TBSA – TBSA0004)

**Subject:** Failed Electric Solenoid Valve due to water ingress in safety circuit.

**Date:** 09/11/2007

**Applicable to:** All JUG-A-0 UL/UV V2 Machines

**Note:** Minimum PPE required to carry out any inspections contained in this TBSA shall be protective clothing & footwear, safety glasses, hearing protection and any site specific requirements. A JSA or equivalent should be carried out prior to performing these tasks.

### **Occurance:**

A customer was operating a JUG-A-0 UL/UV “V2” (approx 650 hours) October 24th. The machine was travelling out of the mine when it shut down on over temp? The operator waited 5 min before restarting the machine and continued to travel out by. The operator stopped the machine after seeing water vapour and noticed water running out from under the engine bay compartment. The machine was shutdown by the operator. A workshop mechanic was contacted and the machine placed out of service.

### **Investigation & Cause:**

The mechanical low water shut down did not shut the engine down for one of two reasons, either the float arm of the valve got stuck in the shut position not allowing the float to drop with the water level in the 4lt shutdown float tank, and therefore not shutting the engine down, or the foreign material that was found in the make up scrubber water system blocked the make up valve and slowed the water down from entering the scrubber tank quick enough to maintain the correct water level for cooling purposes.

The temperature in the scrubber tank would have then started to rise until RTD #1 inside the scrubber tank sensed 82degC, at which time the operator should have seen the visual alarm by flashing led's in the screen of the electronic display, warning him that the exhaust gas temp was climbing. But the CH4 system was switched into the bypass mode, so that cause the leds to flash all the time regardless of what the exhaust gas temperature was doing.

The exhaust gas temperature would have continued to rise to the 85degC point, when the electronic solenoid 3/2 pilot valve should have lost power causing the spool inside the valve to be pushed back to the shut down position by the internal spring pressure, but that did not happen.

As part of the investigation we disassembled the electronic solenoid 3/2 pilot valve and found that the internals of the valve were badly corroded from water ingress, and that is what caused the spool to be stuck in the position that let the engine continue to run.

During the investigation it was found that the scrubber make up tank air pressure check valve was faulty, allowing pressurised scrubber make up water to flow back into the system air pressure manifold, if the tank was 100% full to the brim, when the Stop / Run valve was switched to the stop position.

The next time the Stop / Run valve was switched to the run position; water would have been pushed out of the system air pressure manifold through the safety circuit pressure regulator and flow restrictor into the Nautitech FLP box and through to the electronic solenoid 3/2 pilot valve.

Judging by the amount of corrosion on the internals of the solenoid valve, the water had been sitting there for some time.

### **Recommendations:**

#### **Immediate Action:**

The following faulty or damaged components were replaced before the machine went back to into service:

- 1 x electronic solenoid 3/2 pilot valve.
- 1 x Pressure regulator
- 1 x scrubber make up tank air pressure check valve.
- 1 x Scrubber low water shutdown valve.
- 1 x Scrubber water makeup water valve and float assembly.
- 1 x Flame trap assembly
- Damaged particulate filter canister rubber seals.

A second JUG-A-0 UL/UV "V2" on site was checked for the same problem but no sign of this problem was found

The customer chose to fit an extra air dryer/filter with a manual drain tap into the air supply line from the safety circuit regulator and flow restrictor to the Nautitech FLP box, to capture any moisture before it can enter the solenoid valve and cause corrosion.

The customer has changed their daily inspections to include checking the dryer bowl for any signs of water.

#### **Future Action:**

VLI Diesel make the following recommendations:

Any machines that have the CH4 monitors being operated day to day in the bypass mode must have the CH4 Sensing head disabled at the display, to allow any visual alarms to be easily noticed by the operators and reported to the maintenance department ASAP.

Toolbox talks are to be held with operators explaining the importance of accurate reporting of any faults and or visual warnings on the electronic display.

Every machine is to be checked for water ingress into the system air pressure manifold by undoing the air supply line to the pneumatic seat valve with the main air isolation valve open and the Stop /Run valve in the Run position, as that is the lowest point of the pneumatic circuit and any water will accumulate there if there is any in the system at all. If there is water present replace the scrubber make up tank air pressure check valve and check the electronic solenoid 3/2 pilot valve for any corrosion and repair/replace as required.

A second check valve is to be fitted to the pressure side of the scrubber water make up tank air pressure regulator, to decrease the possibility of this happening again. Contact VLI Diesel for more information.

Every service is to include the checking for water at the air seat supply hose fitting, and both check valves are to be tested and replaced if found faulty before the machine is placed back in service.

#### **Supporting Documentation:**

None.

#### **Conclusion:**

Please ensure this document is circulated to all relevant personnel within your organisation.

Should you have any further queries please contact your VLI Diesel Representative.

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