valley longwall
INTERNATIONAL
DIESEL DIVISION

Technical Bulletin / Safety Alert

Unique ID No: DES2011-TBSA-04 **Rev:** 0

Subject: Incident Notification - MDA DES 13017 Exhaust Flame Path Joint Failure

Date: 20/05/2011

Applicable to: VLI Diesel Pty Ltd Diesel Engine Systems covered under approval no. MDA DES 13017 (Driftrunner & Brumby)

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

Occurance:

On Wednesday 11th May 2011, VLI Diesel Division (VLIDD) was notified of an exhaust system flame path fixed joint failure on an explosion protected diesel engine system covered by approval no. MDA DES 13017, at a southern NSW coal mine. The fixed joint failure was identified by colliery maintenance personnel at a scheduled 500hr service interval.

VLIDD representatives visited site on Thursday 12th May 2011, with representatives from Industry & Investment NSW to inspect the failure.

Investigation Results & Discussion:

Figure 1 provides a schematic representation of the diesel engine exhaust system under investigation.

Failure of the exhaust system flame path occurred at the fixed joint between the exhaust purifier and the exhaust scrubber tank (Figure 2).

The off drivers side rear stud securing the purifier to the scrubber tank had failed and the appearance of the stud fracture surface was considered consistent with a rapid fatigue failure (Figure 3).

Closer inspection of the upper purifier mounting flange identified evidence of fretting at the location of the washers (Figure 4), indicating this joint had been loose.

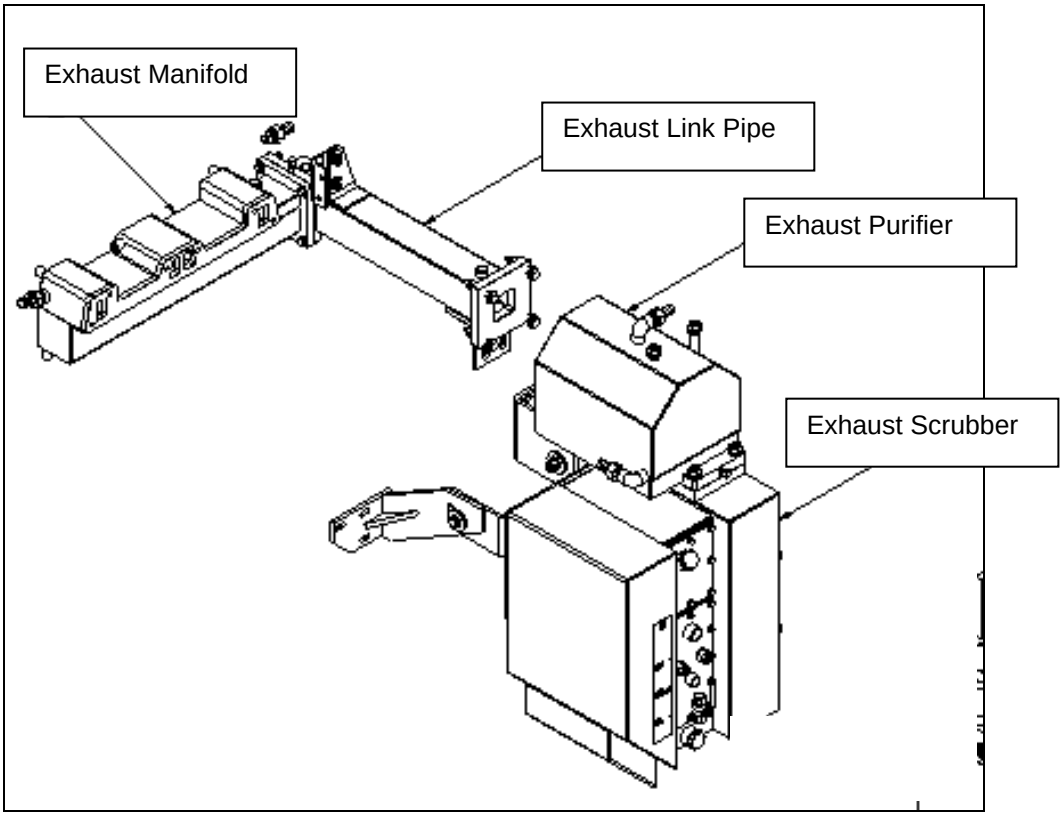

Figure 1: Schematic representation of exhaust system.

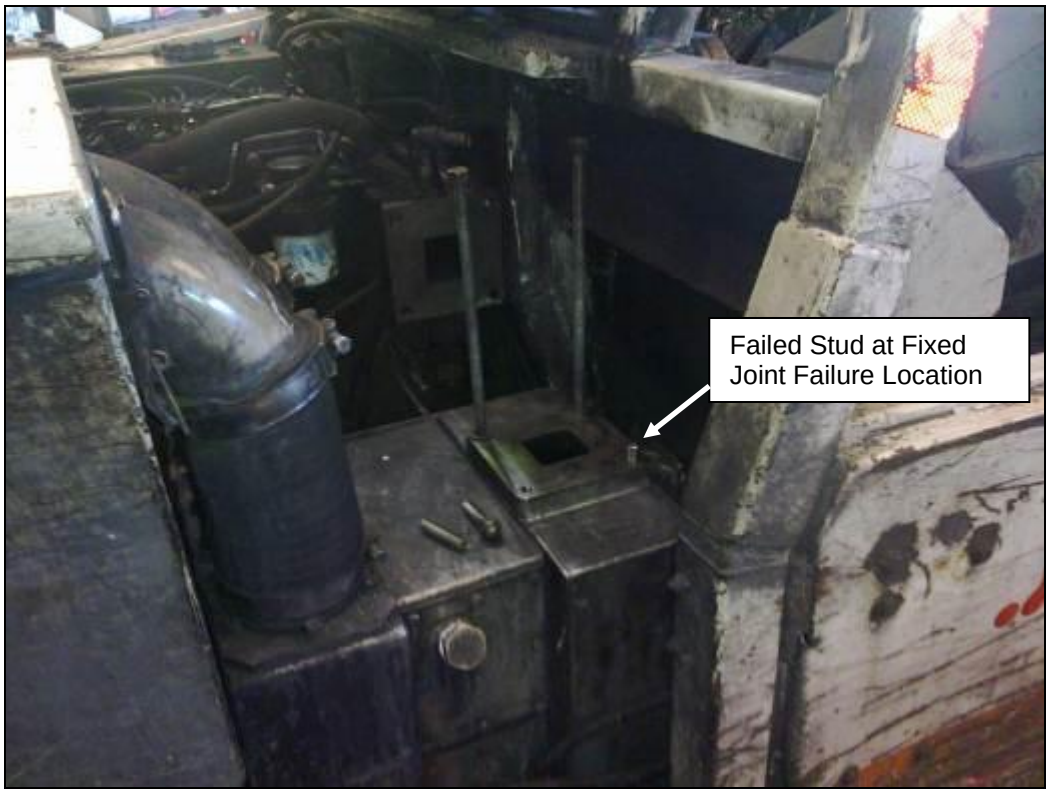

Figure 2: Photograph of the disassembled exhaust system in chassis (with purifier removed), highlighting failure location.

Figure 3: Photograph showing the failed stud at the fixed joint failure location between the purifier and the scrubber.

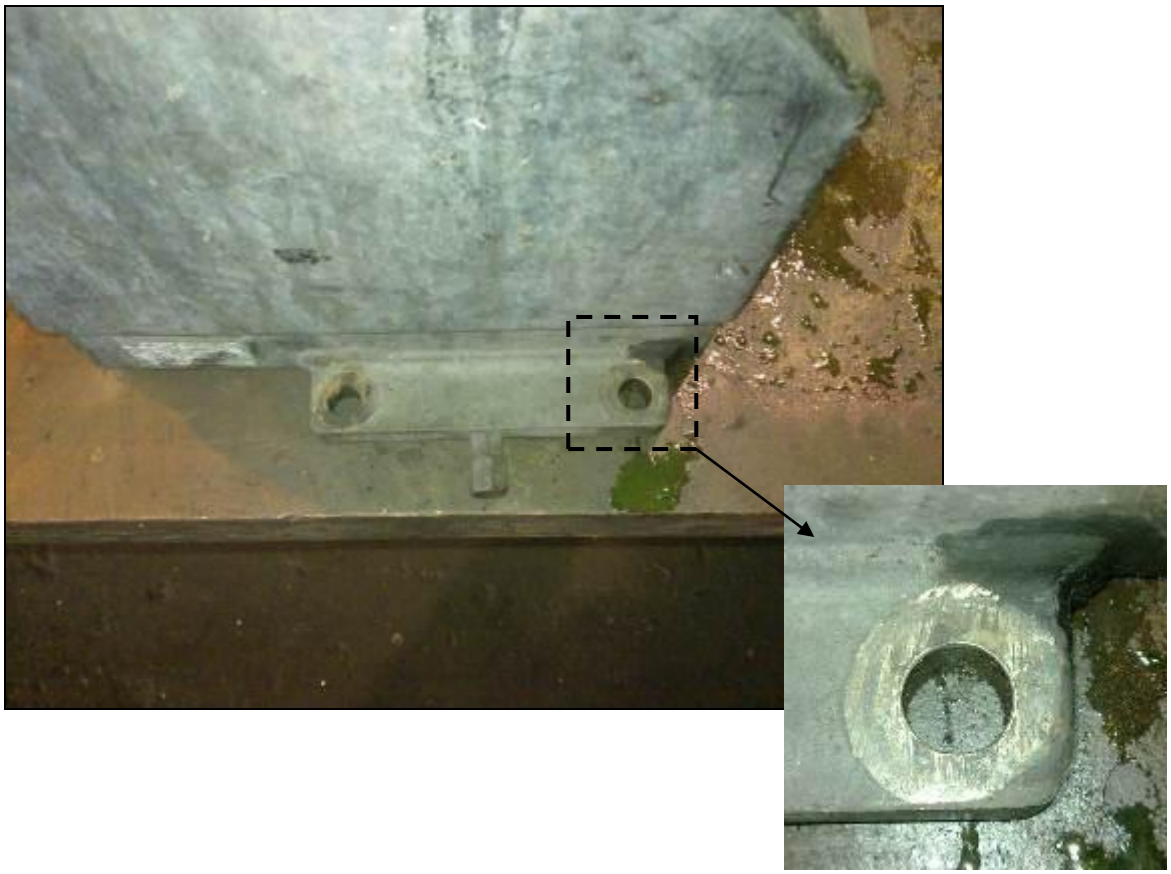

Figure 4: Photographs showing the mounting flange on the purifier, highlighting the fretting where the washers were located.

Visual examination of the link pipe supporting bracket and the adjacent scrubber supporting bracket fastened assemblies exhibited evidence of movement and wear (Figure 5). This suggested the assembly might have lacked sufficient support during previous periods of service. This could have placed additional stress at the fixed joint between the purifier and the scrubber leading to relative movement, fretting, stud fatigue and ultimately stud fracture and joint separation.

Figure 5: Photograph highlighting the apparent movement of the fastened supporting bracket assemblies.

Conclusions:

Failure of the fixed joint between the purifier and the scrubber tank of the diesel engine exhaust system has resulted from the flange joint becoming loose, leading to stud fatigue fracture and ultimately joint separation.

Exhaust link pipe and scrubber tank supporting bracket fastened joint movement might have contributed to the initiation of this failure.

Recommendations (End User):

It is recommended the end user complete an investigation into this failure and review the maintenance history of this and other vehicles on site to confirm required inspections and services have been completed, and that only OEM supplied components have been used as replacement parts.

Recommendations (VLIDD):

VLIDD to review the design of the exhaust system supporting structure to establish if improved support to the link pipe, purifier (or link pipe extension) and scrubber tank can be achieved without compromising the integrity of the explosion protected exhaust system.

A further TBSA to be issued advising installation and availability of parts for this.

Immediate Action:

All coal mines with VLI Driftrunner and VLI Brumby vehicles containing explosion protected diesel engine systems covered by approval no. MDA DES 13017 (with and without purifiers fitted) are recommended to inspect these vehicles at the earliest possible opportunity to confirm the security of exhaust system flame path fixed joints and mounting bolts. Further routine inspections need to be completed as per VLI service sheets (attached).

Where repairs are required to these exhaust systems, please ensure only OEM supplied components are used.

Please note, as per DES approval drawing information, all fasteners are to be SAE Grade 5 or metric equivalent as a minimum, and all fasteners to have 5 full threads of engagement. When replacing washers ensure hardened steel washers are used.

Please do not hesitate to contact VLIDD should any assistance be required in determining relevance of this issue to end users equipment or assistance in auditing fleets, and repairs where required.

Feedback to VLIDD on the status of end users equipment with regards to this issue would be greatly appreciated.

Future Action:

VLIDD to perform an engineering review regarding the support structure design of the exhaust system to establish if improved support can be achieved. A further TBSA will be issued in relation to this.

Supporting Documentation:

Please refer attached excerpts from MDA DES 13017 Mechanical Code D Inspection and Test Sheet (VLIDD Document No. OPER-15014) for Exhaust Flamepath and Exhaust Mounting Bolt requirements.

Please also refer attached VLIDD Driftrunner and Brumby service sheets for required inspections and checks during routine scheduled servicing.

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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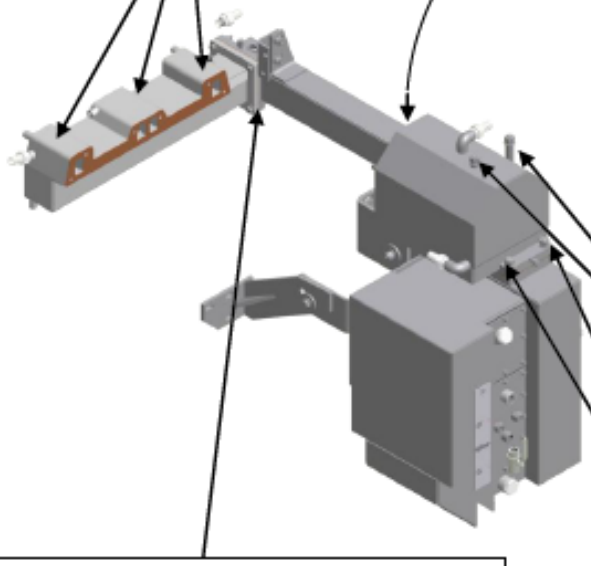
EXHAUST SYSTEM FLAMEPATH BOLTS

FLAMEPATH BOLTS
Bolt Size: SKM10mm x 160mm Min Grade 5
Number of Bolts: 6
Tension: 34Nm
Complete: ❒
Initial:

FLAMEPATH BOLTS
Stud Size: 1/2" x 55mm Min Grade 5
Nuts: 1/2" Conelocks Min Grade 5
Number of Studs: 4
Tension: 77Nm
Complete: ❒
Initial:



FLAMEPATH BOLTS
Bolt Size: HH1/2" x 305mm Min Grade 5
Number of Bolts: 2
Tension: 77Nm
Complete: ❒
Initial:

FLAMEPATH BOLTS
Bolt Size: HH3/8" x 2" UNC Min Grade 5
Nuts: 3/8" Conelocks Min Grade 5
Number of Bolts: 4
Tension: 34Nm
Complete: ❒
Initial:

FLAMEPATH BOLTS
Stud Size: 1/2" x 65mm Min Grade 5
Nuts: 1/2" Conelocks Min Grade 5
Number of Studs: 2
Tension: 77Nm
Complete: ❒
Initial:

EXHAUST SYSTEM MOUNTING BOLTS

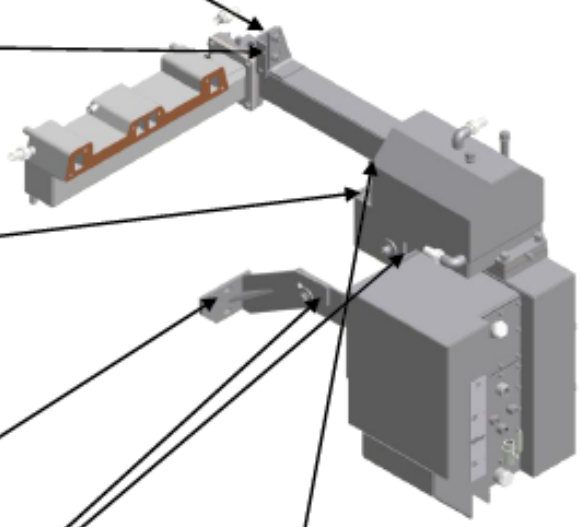
MOUNTING BOLTS
Bolt Size: HH3/8" x 1 ½" Min Grade 5
Nuts: 3/8" Conelocks Min Grade 5
Number of Bolts: 2
Tension: 34Nm
Complete: ❒
Initial:

MOUNTING BOLTS
Bolt Size: HHM10mm x 25mm Min Grade 5
Number of Bolts: 2
Tension: 34Nm
Complete: ❒
Initial:

MOUNTING BOLTS
Bolt Size: HHM12mm x 40mm Min Grade 5
Number of Bolts: 2
Bolt Size: HHM12mm x 30mm Min Grade 5
Number of Bolts: 2
Tension: 77Nm
Complete: ❒
Initial:

MOUNTING BOLTS
Bolt Size: HHM10mm x 30mm Min Grade 5
Number of Bolts: 3
Tension: 34Nm
Complete: ❒
Initial:

MOUNTING BOLTS
Bolt Size: HH1/2" x 2" Min Grade 5
Nuts: 1/2" Conelocks Min Grade 5
Number of Bolts: 2
Tension: 77Nm
Complete: ❒
Initial:



MOUNTING BOLTS
Bolt Size: HH3/8" x 1" Min Grade 5
Number of Bolts: 2
Tension: 34Nm
Complete: ❒
Initial: