

Safety Alert – Viton O-rings

Issued by the Brutus Recovery Team, SEPCo, New Orleans

The Brutus TLP in the Gulf of Mexico took a controlled shutdown on 12th February 2002, following four observed gas leaks (3 very minor and one of 8 mcf) in similar circumstances, all from valves in HP & IP service (600 psi or greater). The failure mechanism would appear from the investigation to date to be explosive decompression of Viton elastomer o-ring seals (see figure below). Explosive decompression is a process in which gases that have been trapped within the given material are rapidly liberated and can cause seals to blister and fail. The Viton elastomer is commonly found in (but not limited to) ball valves, check valves, rotating equipment seals, and pressure safety valves. An investigation team has subsequently carried out a large inspection program all over the facility, inspecting more than 100 components. Over 70% of the Viton elements inspected are, in the opinion of the team, defective or questionable; suffering some degree of explosive decompression. The investigation team has concerns in the following areas:-

- (i) Viton GF Elastomer has been used in o-ring seals that would appear to be below that required for the operating requirement; namely that it is not explosive decompression resistant at certain operating pressures.
- (ii) Viton A & B elastomer material is showing a deterioration of quality, compared to Viton A & B elastomers installed previously in our operations.

Of the elastomers inspected above, approximately 80% of those inspected were Viton GF in HP, IP or LP service (and 29% of which exhibited a high or moderate degree of ED). The remaining 20% were Viton A & B in HP or IP service (of which 54% exhibited a high or moderate degree of ED).



Figure 1: Failure Mechanism – Explosive Decompression

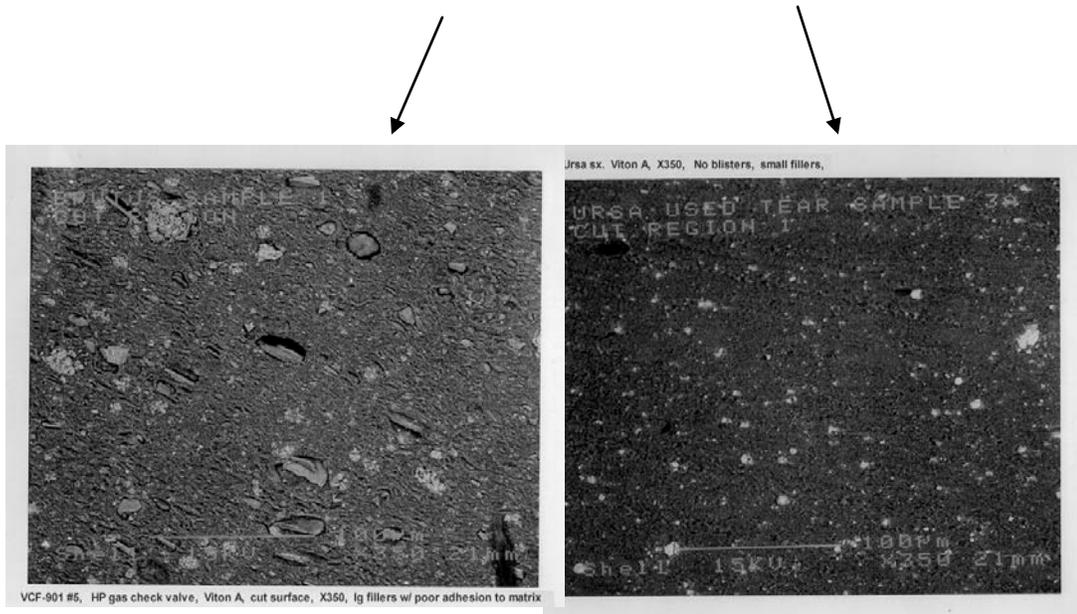
Viton GF

The investigation team has concluded that Viton GF is not explosive decompression resistant at certain operating pressures. It is recommended that your inventories are checked to ensure that Viton GF is not being inappropriately used in your operation. Please be additionally aware that the team's laboratory analysis to date demonstrates that some of the Viton GF used at Brutus exhibits hardness below the product specification range. In all circumstances, please satisfy yourself with respect to the quality of Viton products used.

Viton A & B

Viton A and B is widely used on SEPCo TLPs built prior to Brutus. There is evidence that some of the Viton A used at Brutus was less ED resistant than samples taken from a previously constructed TLP, Ursa. The following SEM photomicrographs show, for the Brutus sample, the existence of large filler inclusions which also appear to exhibit poor bonding to the elastomer matrix. The matrix itself is coarsely grained when compared to the used Ursa sample on the left. The used Brutus example exhibited ED, the used Ursa sample did not.

Figure 2: - Comparison of Brutus Viton-A & Ursa Viton A



It is recommended that your inventories are checked to ensure that Viton A & B is of the required quality and specification for your operation. This includes repairs that may have been carried out over the last 36 months.

If you have any queries on the above, please contact John Bertucci on 1-504-728-7389.

////End of Alert