



**U.S. Department of the Interior
Minerals Management Service
Gulf of Mexico OCS Region**

Safety Alert No. 201
June 19, 2002

Contact: Jack Williams
(504) 731-3012

Viton "O"-Rings Failure

Recently, an operator took a controlled shutdown at a major deep-water production platform following six observed gas leaks to atmosphere in similar circumstances, all from valves in the HP and IP service (600 psi or greater). The valve failures included 10- and 12-inch valves— five with trace leakage and one with significant (8 mcf) leakage.

Following an investigation, the operator reports the failure mechanism to be explosive decompression (ED) of High Fluorine and Fluorocarbon (commonly referred to as "Viton family") elastomer o-ring seals. Explosive decompression is a process in which gases that have been trapped within the given material are rapidly expanded, causing seals to blister, crack, and fail. The Viton elastomer is commonly found in ball valves, check valves, rotating equipment seals, and pressure safety valves.

Of concern to the operator are the following elastomers: (1) High Fluorine FKM (such as Viton GF) elastomers, used in "o"-ring seals and which are apparently not explosive-decompression resistant at certain operating pressures; (2) Fluorocarbon FKM (such as Viton A & B) elastomer, unless quality controlled with regard to hardness and other properties.

The operator inspected more than 100 components following the above failures. Over 70 percent of the Viton elements inspected are possibly defective or questionable, suffering some degree of explosive decompression. High Fluorine FKM was more susceptible to ED than other elastomers.

The operator concluded that some FKM elastomers are not resistant to explosive decompression at certain operating pressures. In addition, some laboratory analysis to date demonstrates that some elastomers exhibit hardness (a key quality regarding ED resistance) below the product specification range. The operator concluded that some Fluorocarbon FKM used in more recently commissioned projects are less ED resistant than samples taken from earlier construction.

The operator has recommended that inventories of the subject elastomers be checked to ensure that they are of the required quality and specification for an operation. These include materials that may have been obtained over the last 36 months. The operator also recommends that inventories be checked to ensure that elastomers are not being inappropriately used in pressures for which they do not meet the design criteria. The elastomer materials in question may have been used in valves constructed by several manufacturers within the last 36 months.

The MMS has not carried out independent tests to confirm the above data for the purpose of this Safety Alert. However, the MMS believes the data presented are of importance to the industry and recommends operators review their individual use of the above materials.

—GOMR—MMS—

[Visit our Safety Information Website](#)