



Mechanical Seal Analysis (MSA)

Date	4/29/19	Pump Position	-
MSA #	2019-025	Seal Manufacturer	FSI
Inquiry #	I-19-0061	Seal Model	R2080NSP0030-2330
Customer	Anchor Seals	Shaft Size	1.875"
Customer Ref #	-	Drawing #	FSI-2330
End User	USS Clairton Works	Seal Serial #	01900-R02
Pump House	TEC	Inboard Rotary Material	Silicon Carbide
Contact	Jason DiBiase	Inboard Stationary Material	Tungsten Carbide
Phone	412-299-6900	Outboard Rotary Material	Silicon Carbide
Salesperson	House	Outboard Stationary Material	Tungsten Carbide
		Elastomers	Kalrez 6375

General Seal Condition

Seal was returned assembled cover in product. The Gland shows signs of heat on the ID from the sleeve making contact.



Figure: 1 & 2 Seal Assembly

Seal Face Conditions

Inboard Tungsten carbide stationary face was coated in product. Once cleaned it showed an even wear pattern.

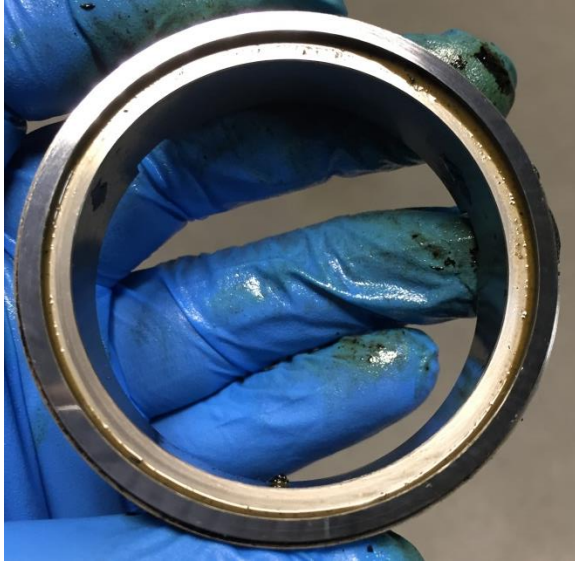


Figure 3: Inboard Stationary Face

Inboard silicon carbide rotary face was coated in product. Once cleaned it showed an even wear pattern.



Figure 4: Inboard Rotary Face

Outboard Tungsten carbide stationary face was covered in barrier fluid. Once cleaned it showed an even wear pattern.



Figure 5: Outboard Stationary Face

Outboard silicon carbide rotary face was coated in barrier fluid. Once cleaned it was cracked in two locations caused by the impact of the Sleeve hitting the Gland.

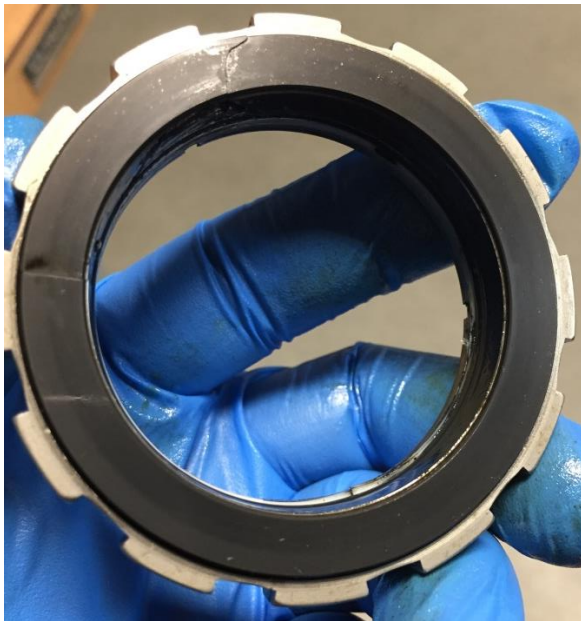


Figure 6: Outboard Rotary Face

Elastomers

All O-rings look to be in good working order. The PTFE anti extrusion ring was damaged during disassembly.



Figure7 & 8: O-rings

Metal Components, Springs, Pins

Gland Plate, Sleeve, Locating Sleeve, and Outboard Thrust Disc all show signs of making contact and building heat. The other metal components were found covered product but in good working order.



Figure 9: Metal Components

The ID of the Sleeve is discolored due to excessive heat.



Figure 10: ID of Seal Sleeve

The ID of the Gland is discolored due to heat from rubbing the OD of the Sleeve.



Figure 11: ID of Gland

The OD of the Locating Sleeve is discolored from making contact with the ID of the Gland. Note that the rub is not the entire way around the locating sleeve.



Figure 12 & 13: OD of Locating Sleeve

The Inboard springs were coated in product and the Outboard springs were coated in barrier fluid.



Figure 14: Inboard Springs, Figure 15: Outboard Springs

Failure Explanation/Recommendation

Failure Explanation: The seal sleeve made contact with the gland ID causing the discoloration of the Sleeve and Locating Sleeve as well as the wear marks as noted above. Since the rubbing occurred on part of the sleeve and not the entire OD, the seal appeared to be cocked or not concentric. The impact and heat caused by the sleeve wearing on the gland caused the Outboard Rotary Face to crack resulting in the seal failure.

Recommendation: Check concentricity of the stuffing box of the pump. Make sure seal is installed properly with the proper torque on all set screws and gland bolts.

Additional Note: