



Mechanical Seal Analysis (MSA)

Date	3/20/19	Pump Position	TTYP-1
MSA #	2019-018	Seal Manufacturer	FSI
Inquiry #	I-19-0046	Seal Model	MS2080N00
Customer	Anchor Seals	Shaft Size	1.875"
Customer Ref #	2178982	Drawing #	FSI-2330
End User	USS Clairton Works	Seal Serial #	02211
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 product had hardened and was preventing the seal from rotating.



Seal Face Conditions

Inboard Tungsten carbide stationary face was coated in product. Once cleaned it shows chipping on the ID and heat checking across the face.



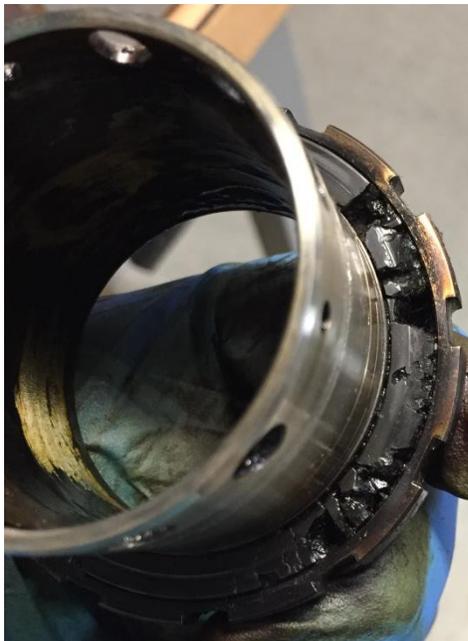
Inboard silicon carbide rotary face was coated in product. Once cleaned showed a groove wore into the sealing face.



Outboard Tungsten carbide stationary face was covered in product. Once cleaned it had chipping around the OD.



Outboard silicon carbide rotary face was coated in product. Once cleaned it was cracked, chipped and broken in several locations.



Elastomers

All O-rings are swollen, hardened and were extruding from grooves.

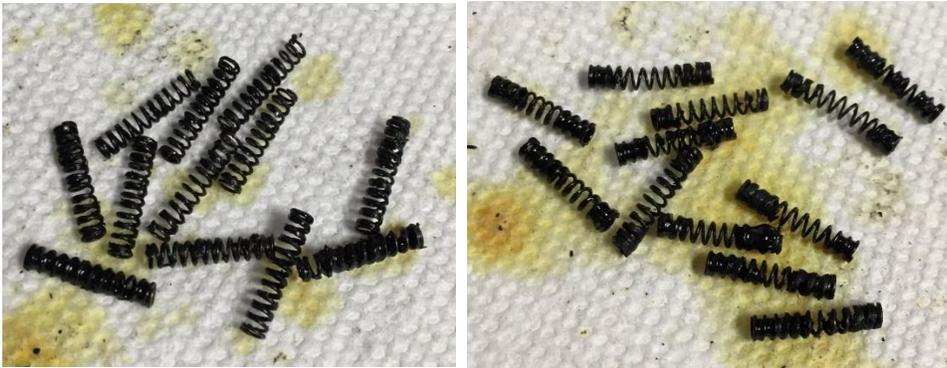


Metal Components, Springs, Pins

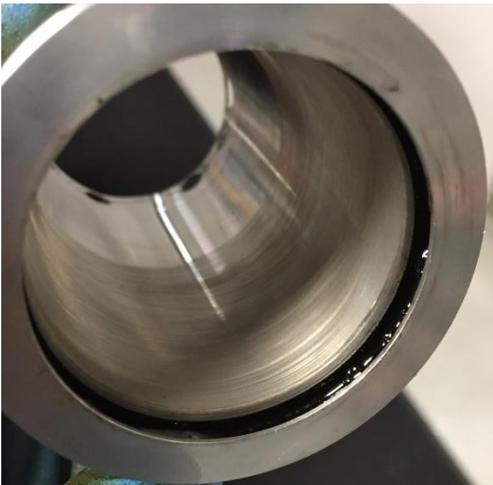
Gland Plate, Inboard Gland, Sleeve, Thrust Discs, Back Up Rings, Seat Carrier and Drive Collar were found covered product.



Springs were coated with product but flexed freely once removed. While installed they were stuck due to product.



Sleeve shows signs of rubbing on the ID.



Due to hardened product the Locating Sleeve was stuck to the sleeve and damaged during disassembly.



Failure Explanation/Recommendation

Failure Explanation: It would appear that this seal failed due either hardened product sticking the inboard faces from sealing or the barrier pot not being maintained at the correct level/pressure. Both barrier ports were clogged with the hardened product. This indicates that the barrier fluid was lost at some point during operation. The product appeared to build-up in the seal. Torque from the pump along with the hardened product resulted in the broken and chipped faces. Evidence to further support this is the rubbing on the ID of the sleeve and the flattened drive screws. This means that at some point during the operation the shaft rotated inside of the seal sleeve due to the hardened product.

Recommendation: It is recommended to keep the barrier fluid in the seal pot at the recommended level and pressurized 15-25 psi above the maximum stuffing box pressure. This practice will help maintain the proper pressure differential between the process fluid and barrier fluid. Also in order to prevent the loss of the seal in the event of the loss of barrier fluid we suggest installing a low level alarm and/or a pressure switch.

Additional Note: