



Mechanical Seal Analysis (MSA)

RB Work Order #	3762903	Failure Code	S1002
Date	08/31/17	Pump Position	2019
MSA #	2017-086	Seal Manufacturer	FSI
Inquiry #	I-17-0199	Seal Model	1040/HD
Customer	Anchor Seals Inc.	Shaft Size	2.125"
Job #	2162348	Drawing #	2395-B
End User	USS Clairton	Seal Serial #	02061
Pump House	Total Equipment Co.	Inboard Rotary Material	Silicon Carbide
Contact (TEC)	Ron Sipes	Inboard Stationary Material	Carbon
Phone	(412) 269-0999	Elastomers	Kalrez 1050 LF
Salesperson	Jason DiBiase	Install Date	11/17/2015
		Removal Date	08/31/2017
		Days in Service	653

General Seal Condition

Inboard side of seal was coated in hardened product. Flush and Quench ports were free of debris. Drain port was partially filled with debris.

Seal Face Conditions

Inboard

Stationary: Carbon – recessed carbon nose (Figure 1)

Rotary: Silicon Carbide – heat checking, recessed wear groove (Figure 2)



Figure 1



Figure 2

Elastomers

Elastomers showed no signs of thermal, mechanical, or chemical degradation.

Metal Components, Springs, Pins

Gland – coated with hardened product, no metal deformation (Figure 3)

Sleeve – coated with hardened product, no metal deformation

Springs – filled with product



Figure 3

Failure Explanation

The seal appeared to have failed due to lack of lubrication across the seal face. The product worked its way between the faces causing the grooving. It also clogged the springs not allowing axial movement.

The drain port not being clear would indicate the product was solidifying before draining. This could indicate the quench not operating correctly.

Recommendation

Ensure steam quench is operating at 3-5 psi to keep product in a liquid state to aid in draining. Once product becomes hardened it will cause significant damage to seal.