

INTRODUCTION

In recent months, the 7FH2 Packaged Generator has been experiencing trouble with the Seal Oil System during system commissioning and unit start-up. To facilitate communication and ensure a complete inspection of the system, a Process Map was developed to help troubleshoot the system and collect sufficient information before beginning discussions with Product Service/Generator Engineering. The following process map defines a formal procedure for the inspection of the Seal Oil System components after disassembly.

The purpose of this Process Map is to publish (Internal to GE) the method of reasoning commonly used by Generator Engineering when evaluating Seal Oil System trouble. This process helps site personnel observe system behavior, and provides answers for commonly asked questions by Engineering. The Data Sheet following the Process Map defines the level of information required to effectively troubleshoot the system.

HISTORICAL PROBLEMS

Following are the most commonly observed issues with the Seal Oil System during start-up.

1. Seal oil drain enlargement (SDE) liquid level detector alarms.
2. Generator lower-frame liquid level detector alarm.

These issues are easily identified, yet determining the individual root cause is difficult due to the interdependencies of the system's multiple parameters.

DISCUSSION OF INDIVIDUAL ISSUES

Seal Oil Drain Enlargement (SDE) Liquid Level Alarm

The seal drain liquid level alarm is a signal generated by excessive oil level in the Seal Oil Drain Enlargement Tank. This is the first signal of a potential issue related to the flow of oil through the seal drain system, or of a malfunction of one of the system components.

Any of several events may cause an SDE liquid level alarm, but most common are:

- Excessive oil flow through the gas side of the seal oil system. This can be caused by malfunctioning of the seals, a bad setting on the seal oil regulator, failure of the seal assembly, bad or inaccurate gas pressure return signal to the seal oil regulator, worn or damaged seals (bad seal clearances), or seal oil properties not within GE specifications (Hot Oil).
- Liquid Level detector malfunction or bad setting.

- Seal Drain Enlargement Tank out of specification. Typical issues identified with assembly include the standoff pipes inside the SDE tank being placed below the required height, sleeve for drainpipe welded all around, or obstruction in pipes between the SDE tank and the float trap. Also, a differential pressure between the two sides of the SDE tank will result in an increase of oil level in the loop seal, thus causing one side of the tank to have a higher oil level.
- Float trap malfunction. In many cases, the float trap was found to be a prime contributor to SDE backup. Issues with the float trap include a.) improper assembly of internal components, b.) wrong orifice size, c.) damaged float trap balls or vent lever arm, d.) obstructions of flow through the orifice, e.) seal oil temperature above design limits, f.) SDE pressure below trap minimum operating differential pressure. (Trap requires 3 PSID minimum to function properly.)

Generator Lower-Frame Liquid Level Detector Alarm

The Lower-Frame liquid level alarm, also referred to as the Generator Belly Liquid Level Alarm, is an signal generated by the presence of liquid in the belly of the generator. This alarm signal is the first indication of an unexpected flow of **oil** or **water** into the Generator. Immediate action must be taken to correct this problem.

Following are the most common causes of Generator Belly Liquid Level Alarm.

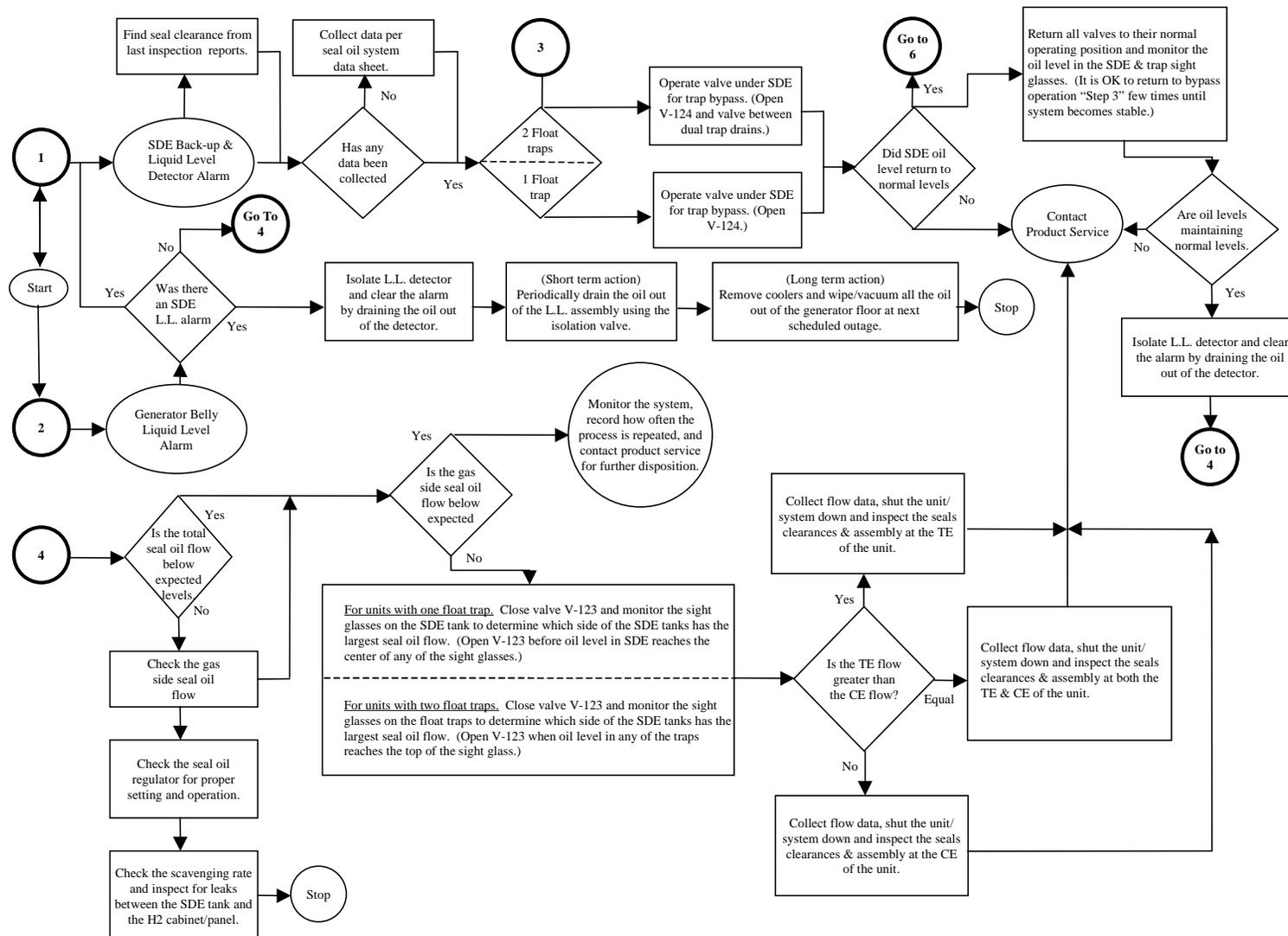
- Obstruction of seal oil drain lines between the end shield and the SDE tank. The most common obstructions result from loosening of the inner oil deflector horizontal joint dowel, thus substantially reducing the capacity of the drain hole in the end shield. This causes the cavity between the hydrogen seal casing and the inner oil deflector to fill, and the oil to migrate into the generator between the inner oil deflector and the shaft. In other cases, assembly or installation errors have caused obstructions (i.e., protective tape not removed before making up the pipe flanges). Further, the manufacturing or installation process of the hydrogen seal casing can also cause oil to flow into the generator. If the contact around the seal oil feed hole on the casing to the end shield is less than one hundred percent, the high pressure supply seal oil can bypass the seals between the casing and the end shield, thus causing overflow in the seal oil cavity.
- Cooler tubes failure. With cooler tube failure, water pressure will normally be greater than gas pressure in the unit, thus forcing water to flow into the generator.

Field Engineers Manual – Generator

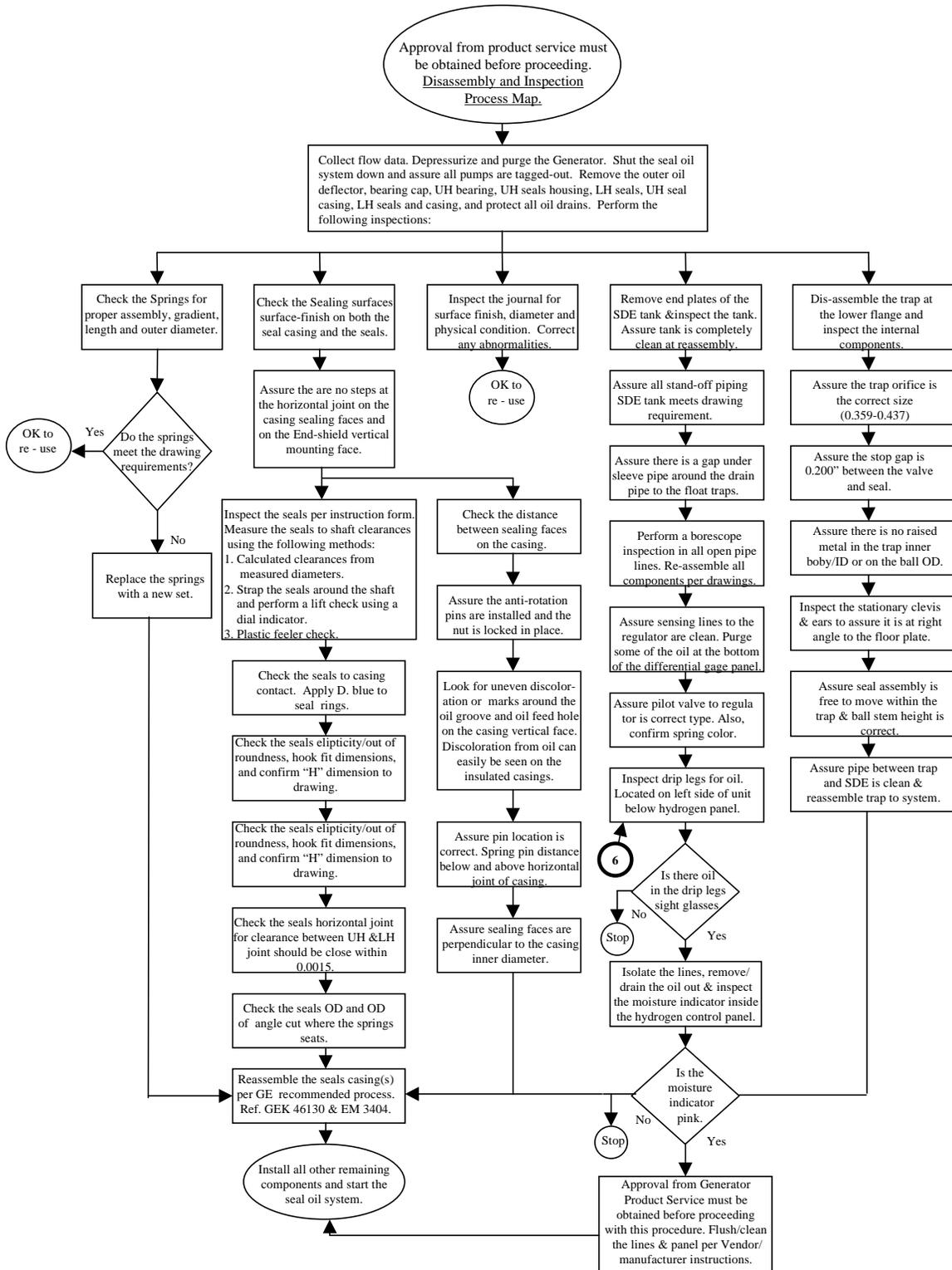
EM 3405

Subject Seal Oil System Troubleshooting Guide – 7FH2 Generator

October 5, 2000
Page 3



Seal System Component Inspection Flowchart



Field Engineers Manual - Generator

EM 3405

Subject **Seal Oil System Troubleshooting Guide – 7FH2 Generator**

October 5, 2000
Page 5

Unit S/N #

Date:

Fan Diff. Press. "H2O	Gen. Casing Pressure (PSI)	Scavenging Rate TE (CCM)	Scavenging Rate CE (CCM)	H2 Consumption Total (CCM)		Gas Analyzer Purity TE	Gas Analyzer Purity CE	Gas Analyzer Temp. TE or CE Deg.F	Seal oil Temp. Deg. F	Seal oil Press. after Flow meter (PSI)	Float Trap Status.	SDE oil Level Status TE (As seen in sight glass)	SDE oil Level Status CE (As seen in sight glass)	Seal oil Flow to Seals (GPM)	Seal oil Flow After Float Trap (GPM)	Unit Output (MW) or RPM
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case											
					Cavity											
					Case		</									