

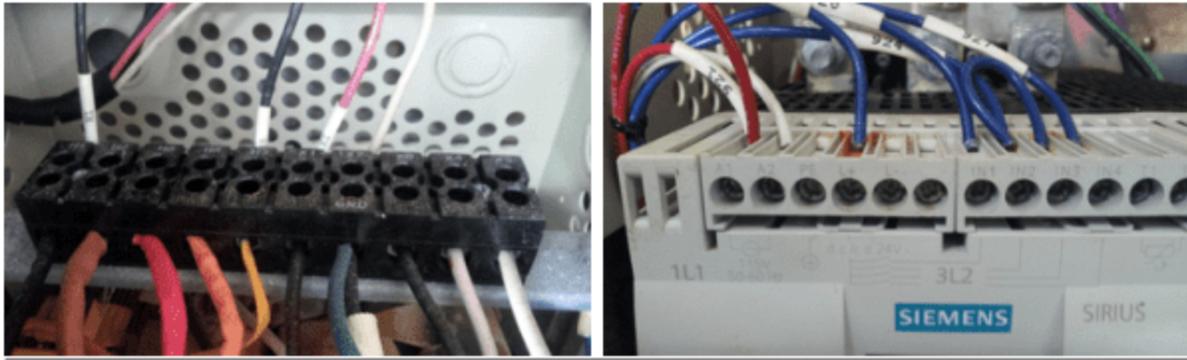
Little St. James Service Report:

Feb. 24th, 2014

February 18th, 2014 we started the contracted work at Little St. James Island (LSJ) of replacing the entire contents of the SWRO high voltage control panel that had received severe damage following an incident that sprayed high pressure seawater throughout the panel.

Upon entering the SWRO plant Tuesday 2/18/2014 there had been another pipe burst incident and seawater was all over the floor and on the skid of new replacement parts had been sprayed with seawater too. There were several burst tubing connections due to the SWRO plant being operated manually and allowed to run at 980psi. We checked the contents of the new parts and it was determined that the parts inside the wet cartons were not damaged by this latest incident, so we moved forward with replacing the components of the damaged control panel. Below are photos of the parts removed from the damaged control panel. NOTE: ALL components inside the panel were replaced.





There was a lot of salt and rust on the components inside the panel as noted above. Great care was taken to clean the panel completely before installing any new components. The finished product was a completely new high voltage control panel as is pictured below.



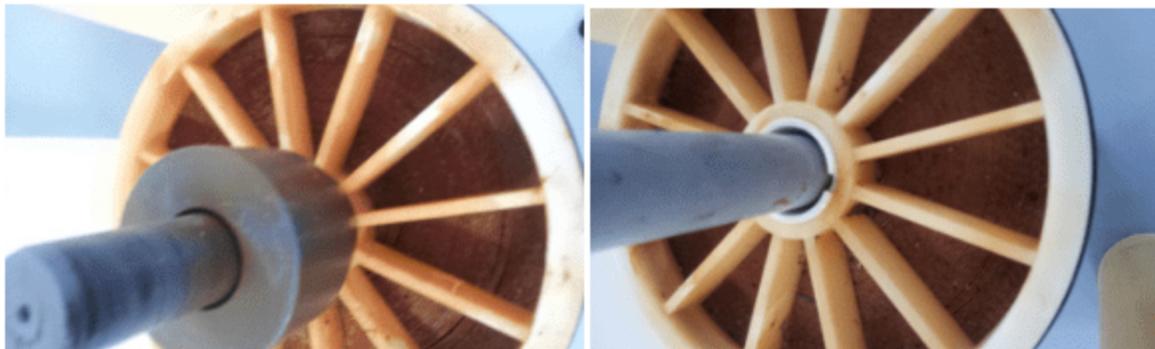
During our Service on 2/18/14, I instructed the LSJ operating crew to remove the end caps from the membrane vessels to look for foreign objects that could be causing the high membrane feed pressure that initially caused this incident. Below is what was found with the lead membranes in all four vessels severely fouled from FOD (Foreign Objects & Debris) Membrane pictures are below:

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These two membranes show rocks, gravel, dirt, and debris that has passed through the cartridge filters and entered the membrane vessels.



The membranes pictured below show severe fouling due to dirt and rust. The picture left shows mechanical damage noted by gaps in the membrane material



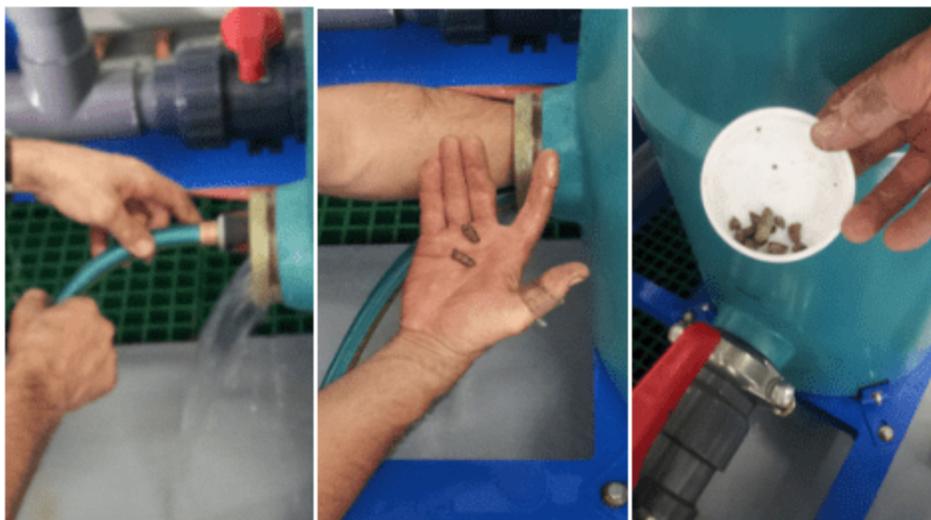
It was determined that the best approach for getting the system back to acceptable operational membrane feed pressures was to replace the two lead membrane elements in all four tubes as they were the most severely fouled. Eight membranes were all that TSG had available, and it is suggested that the other 16 of the 24 total membranes be replaced in the LSJ SWRO plant as soon as is possible to bring the system back to its original design pressure parameters of 780-850 psi membrane feed pressure.

2/19/2014: We arrived on the morning Barge and set out to complete the electrical installation as we waited for approval from LSJ to replace 8 of the 24 membranes in the SWRO. After completing the electrical panel, we had issues connecting the SWRO systems virtual machine computer due to corrosion on the Ethernet port. LSJ's IT person was called in to repair it. Nothing could be checked without the plant running, so we decided to further our investigation into the root cause for the severe membrane fouling and high membrane feed pressure. We found operational issues that were documented by photos below.

The picture below shows debris left in the Media filters after backwash. Filters backwashed using flow rates too high cause media to be backwashed out of the filter, into the piping and transferred to the Cartridge filters. I explained to Smiley how to watch and balance MMF Backwashing.



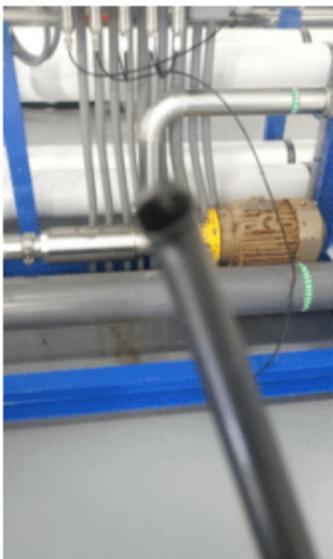
We then focused our attention on the Cartridge Filter Housing. Filters were removed, the spool piece connection was removed and the housing was thoroughly cleaned out. Dirt, sand and rocks were removed from the housing. Pictures are below.



The remainder of the day was spent changing out the membranes and locking down the end caps.

2/20/2014. We arrived with TSG's Virtual Machine Computer. Power was restored to the SWRO plant, electrical connections were checked, and the PLC program was gone through, checked, and tested by our controls engineer in Gainesville, Fl. By mid-morning, we were ready to start the plant only to have issues with low feed water pressure and several more leaks. We had to backwash the MMF's, change out all of the high pressure tubing on the systems instrumentation connections, Repair the HP Pump oil pressure gauge, and replace the high pressure flange gasket on the high pressure pump.

NOTE: There were NO gaskets or fittings onsite, and we had to get a LSJ boat to take one TSG engineer from LSJ Island to Red Hook to pick up parts brought to us by another TSG employee. See pictures below:



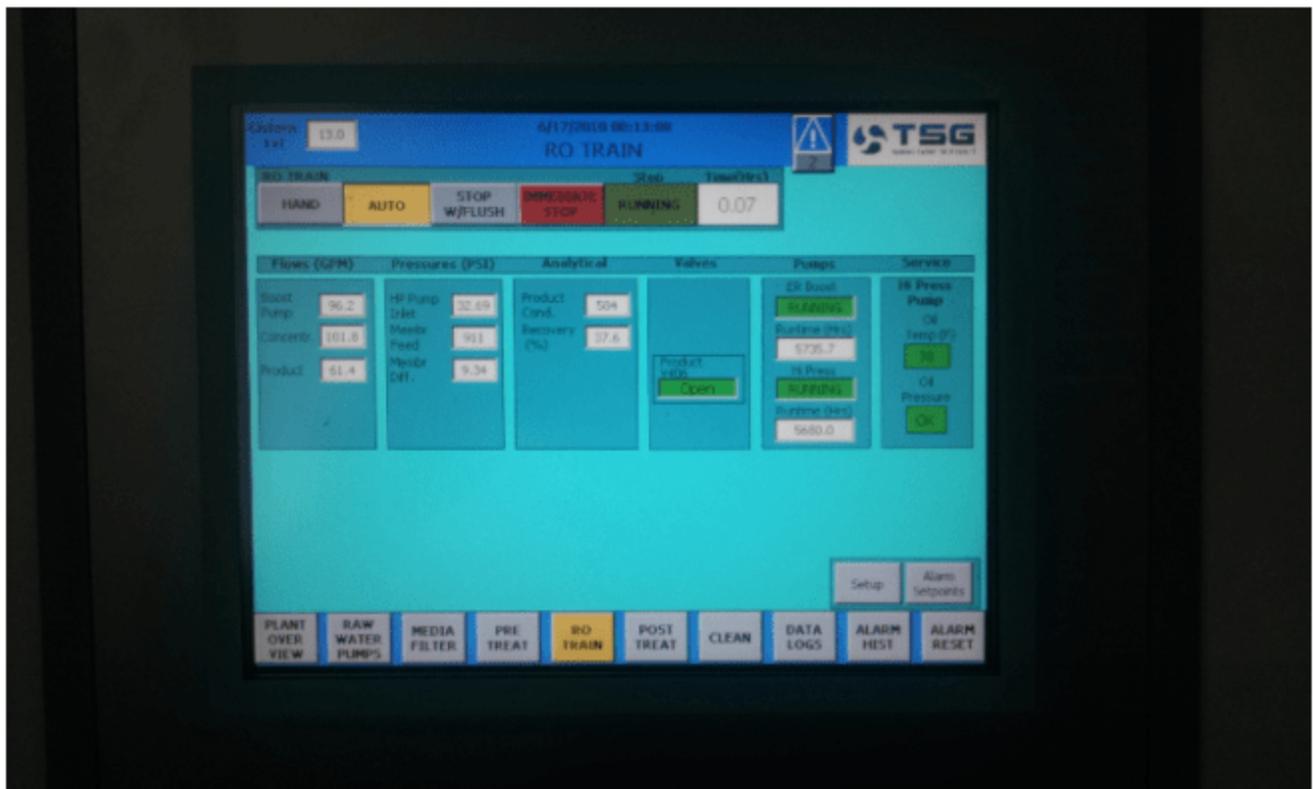
Afterwards, we started the SWRO plant only to have issues with the SW intake pumps continually losing prime. The LSJ crew tried for two-three hours to get the pumps primed without success. At 3:30pm, Danny had found a cracked basket strainer lid on the intake pump system that was causing the intake pumps to lose prime.

2/21/2014. We arrived at LSJ after being assured by Danny that the intake pumps were operational. We started the SWRO Plant. The plant started automatically without issue and ran without problems. Several of the SWRO plant's safety alarm features were tried including;

1. Low pressure alarm shut-down (25psi)
2. High pressure alarm shut down (950psi)
3. E-stop
4. High Conductivity (1,000 uS/cm)
5. Low permeate flow (45gpm)
6. High permeate pressure (60psi)
7. Low Boost pump flow alarm shut down (60gpm)

All of the above alarms were simulated during the initial run and found to be operating correctly.

It was noticed during the initial service run that the Membrane Feed Pressure was still higher than normal and shows that there has been irreversible damage done to more of the membranes than was initially replaced. We were able to get the pressures down to just above 900 PSI after increasing the SWRO plants brine discharge and Boost Pump flow. The screen shot below shows run parameters.



We then set about the task of calibrating instrumentation, batching pre-treatment chemicals, replacing the tubing on the Sulfuric Acid Chemical feed pump, priming and adjusting all chemical feed pumps using the chemical calibration columns that were provided to LSJ during the initial installation and commissioning of the SWRO Plant. Pictures are below.



We completed the service at 3:00 pm, and left the plant running in auto. I called Monday morning @ 8:30, talked to Danny who attested that the plant ran all weekend without issue and shut down automatically after filling the main cistern completely.

In closing, TSG suggests that we be contracted by you for a complete evaluation of the LSJ SWRO plant and report our findings to insure that LSJ has all necessary information so that the SWRO plant can be brought back to its original operational condition. This evaluation would include; Critical spares list needed to be purchased and stored onsite for future issues that may occur with the SWRO plant. The condition of the SW intake pumps, priming system, and SW intake pipe. The High Pressure pump running condition including both power and fluid sides of the HP pump. Booster Pump liquid end, PX pressure exchangers, and assessment of the post treated water quality.

It would also be beneficial to LSJ that the SWRO plant operator be given some professional training allowing him to receive sufficient experience to be more proactive when maintaining the LSJ SWRO Plant.

Respectfully Submitted,

Patrick Adams

Patrick Adams
TSG - USVI Operations Manager



Cc; Bob Petersen – TSG
John Leet-TSG

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