



Date: 03 / 20 / 2014  
Vessel: El Faro  
Operator: Sea Star Lines, LLC  
Location: Jacksonville, FL.

TESTING RESULTS:

PORT BOILER:

- P alkalinity 160 ppm
- T alkalinity 200 ppm
- Hydrazine 0.03 ppm
- Chlorides 12 ppm
- Phosphate 32 ppm
- Conductivity 700  $\mu$ mho
- Silica 3 ppm
- pH 11.7

STARBOARD BOILER:

- P alkalinity 200 ppm
- T alkalinity 300 ppm
- Hydrazine 0.03 ppm
- Chlorides 11 ppm
- Phosphate 45 ppm
- Conductivity 720us
- Silica 4 ppm
- pH 11.6 us

CONDENSATE:

- pH 8.6
- Chlorides 1 ppm
- Conductivity 8  $\mu$ mho
- Hardness < 0.1 ppm
- Ammonia .1 ppm



DC Heater (DA Tank):

- Pressure 35 psig
- Temp. Steam 280 °F
- Temp. Water 280 °F

COMMENTS ON BOILER WATER TREATMENTS:

- Vessel sailing for North Florida ship yard, plant to be secured on arrival and boilers drained.
- Samples tested indicate very high pH and conductivity. Recommend inspect boiler water sides for deposits and / or signs of caustic corrosion.
- Vessel using very old Thermo pH meter and Ecologic conductivity meter, recommend both be replaced Drew digital meters and appropriate calibration solutions
- Recommend 6 month reagent set be ordered before departing shipyard.
- Feed and condensate samples were taken while underway, to be sent to lab.
- Due to flight delay and short stay of vessel, I was unable to test onboard, samples were taken and tested on El Yunque on 3/21.

Respectfully submitted,

J. Olsen  
Senior Service Engineer  
Drew Marine  
jaolsen@drew-marine.com



DATE 2014-03-31

RFA No.: **RFA-2014-04-001**  
 Sample No.: 02804-001 THROUGH 008  
 Sample Type: WATER  
 Sample Sub Type: ULTRAMARINE  
 Vessel: **EL FARO**  
 Sampling Point:  
 Sample Data: 2014-03-08

**DREW MARINE LAB ANALYSIS RESULTS**

Dear Brady and Doug,

Please find following the analysis report for the subject vessel as part of the ULTRAMARINE coordinated boiler water treatment program. Until all issues have been resolved, the vessel was advised to submit eight samples for analysis from the points listed in the table.

	Chemical Analysis: Acidified Elements	RFA-2014-04-001	RFA-2012-03-020	
		2014-03-19	2012-02-29	
Evaporator Air Ejector Drains	Copper, Total (as Cu)	432	531	ppb
	Iron, Total (as Fe)	< 10	< 10	ppb
LPSG Condensate	Copper, Total (as Cu)	4300	450	ppb
	Iron, Total (as Fe)	1080	< 10	ppb
Reserve Feed Tank – Port	Copper, Total (as Cu)	22.1	170	ppb
	Iron, Total (as Fe)	170	40	ppb
Reserve Feed Tank – Stbd	Copper, Total (as Cu)	211	164	ppb
	Iron, Total (as Fe)	3900	20	ppb
Distilled Tank	Copper, Total (as Cu)	474	248	ppb
	Iron, Total (as Fe)	834	< 10	ppb
Main Condenser Hot Well	Copper, Total (as Cu)	759	< 5	ppb
	Iron, Total (as Fe)	94.2	< 10	ppb
ADT	Copper, Total (as Cu)	108	< 5	ppb
	Iron, Total (as Fe)	82.5	< 10	ppb
Auxiliary Plant Hot Well	Copper, Total (as Cu)	< 5	< 5	ppb
	Iron, Total (as Fe)	19.4	< 10	ppb

Prior sample results are included from sample dated 2012-02-029 for comparison.

Copper is exceptionally high in the following samples: Evap Air Injector Condenser Drain (about 86X), LPSG Condensate (about 860X), Reserve Tank Stbd (about 42X), Distilled Tank (about 95X), Main Condenser Hot Well (about 152X), ADT (about 22X) and high in the Reserve Tank Port (about 4X). The



copper is generally worse than the prior samples.

Iron is exceptionally high in the following samples: LPSG Condensate (about 108X), Reserve Tank Port (about 17X), Reserve Tank Stbd (about 390X), Distilled Tank (about 83X), Main Condenser Hot Well (about 9X), ADT (about 8X) and high in the Auxiliary Plant Hot Well (about 2X). The iron is generally worse than the prior samples.

Any disruptive event between samples has not been noted. If no cleaning has been carried out on the Reserve Tanks and the Distilled Tank, then it should be. If a cleaning has occurred, please isolate the continued source of corrosion metals. Consideration should be given to dumping condensate returns with high levels of corrosion products.

After any cleaning the feed water tanks and distilled tank, deaeration along with feeding and maintaining the proper level of oxygen scavenger will reduce feed water lines corrosion.

For condensate, maintaining proper pH level in the condensate by using SLCC-A along with minimizing oxygen by scavenging and deaeration will reduce condensate lines corrosion.

The ULTRAMARINE program encourages quarterly submission of Feedwater and Condensate samples. The Main Condenser Hot Well will serve as the condensate sample point. The feedwater sample should be taken near the feedwater pumps through a sample cooler. Recommend follow up sampling from all locations after corrective action.

Please revert with any questions.

Best Regards,  
Drew Marine