SUGGESTIONS ON HOW TO BURN USED MOTOR OIL (RFO) IN YOUR BOILER

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1. Choice of Boiler

Scotch Marine Boiler (Figure 1)
The front of the boiler swings open. This gives you easy access to the fire eye and cleaning nozzles. The nozzles last about 3 to 4 months, and cost $175.00. The rear of the boiler (Figure 2) has a manhole cover. This gives you easy access to the rear tube sheet and the Morrison tube.

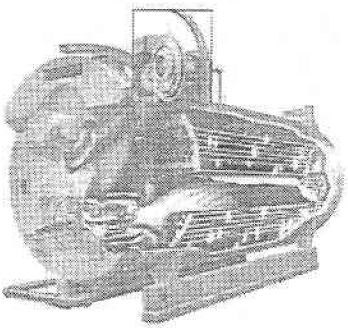

Figure 1. Scotch Marine Boiler

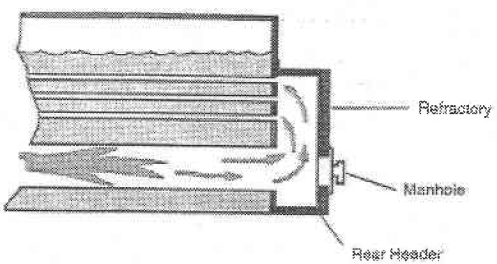

Figure 2. Dry Back SM Boiler

2. Heating Oil

RFO oil is not difficult to burn, but you must heat the oil to between 150 and 180 degrees. This can be accomplished with a steam heater that is controlled with a regulator and control valve (Figures 3 and 4), before the oil goes to the nozzle, and electric heat exchanger is put into the fuel train. The electric heat exchanger has a heat adjustment setting on one end. Fuel that isn't burnt passes by the nozzle and recirculates back to the oil tank. This helps with the heating process.

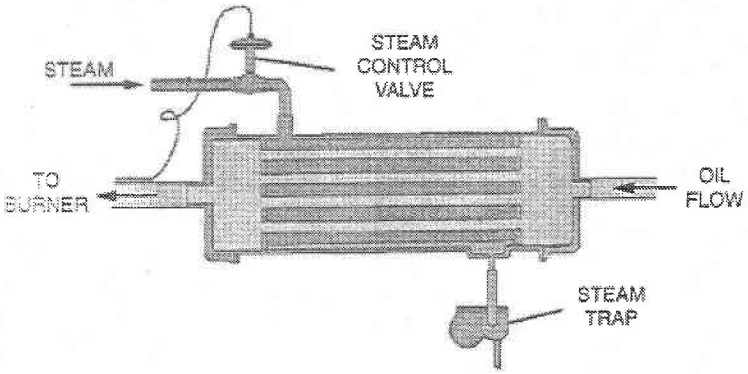

Figure 3. Line Heaters

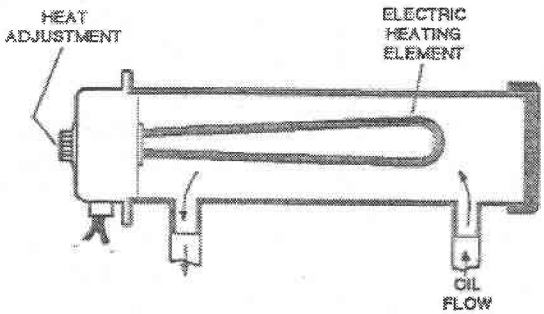

Figure 4. Electric Heat Exchanger

3. Filtering Oil

There are two sets of filters on the fuel trains. The first set of filters is at the fuel tanks before the oil pumps. The other set of fuel filters are just before the electric heat exchanger. Filters are cleaned every three hours, as there is some paper and metal shavings from the refinery left in the fuel.

4. Soot Blower

Since this is RFO, or used oil, it contains quite a bit of ash. At the burner end of the boiler, we have soot blowers. Every tube has its own nozzle. Every three minutes the soot blower pushes air through a section of pipe that cleans each tube. There are six separate sections in the system.

5. Air Atomizing Pump

There is an Air Atomizing Pump at the front of the boiler. The air from the atomizer and fuel mix in the firing nozzle. This fine mist turns into a combustion air stream or flame. Without the Air Atomizer, the fire wouldn't rotate in the Morrison tube and it would be a lazy fire.

6. Maintenance

The most important of all is preventive maintenance.

a. Two times a week, we shut down the boilers, turn off the soot blowers, pull back the manhole covers, and blow out the back tubes of all boilers. This takes 10 minutes. Every two months, we clean the Morrison tube, firing ring, and make sure all the tubes are open and free of ash. This takes a total of 12 hours. Every year, during our yearly inspection, we take our Soot-O-Matic (tube cleaner) and brush out the boiler tubes. Note: If you don't open the back of the boiler and clean the tubes weekly, the boiler will plug up with ash and blow black smoke.

b. Once a week the nozzles must be cleaned. Debris gets into the nozzles and causes an unclean burn. This is very important. This will also cause the boiler to smoke.

c. Steam heater cokes up, so once a year, we pull the heater out and clean the steam heater and electric heat exchanger.

Product	Cost/Gal.	Energy Conversion
RFO Refined Motor Oil	$.60	1 gal.=145,000 BTUs
IFO 380 bunker oil	$.71	1 gal.=152,000 BTUs
Diesel	d$1.07	1 gal.=140,000 BTUs
Natural gas	$.90	1 therm=94,000 BTUs

British Thermal Unit=one BTU is the amount of heat that raises one pound of water one degree.

Costs Using 40,000 Gallons Per Week

	Monthly	Yearly
RFO	$24,000	$288,000
IFO 380	$28,400	$340,000
Diesel	$42,800	$513,600
Natural gas	$36,000	$432,000x1.5=648,000

(using this you would need half again as much)

Savings running RFO over:

Diesel	$225,600/year
Natural Gas	$360,000/yr