

## Converting the Boilers to #2 Oil / Distillate Fuel

LMCF used two sources to calculate fuel consumption rates: Chapman Technical and LMCF Chief Engineer Chuck Cart, who holds an Unlimited Tonnage Engineers license. Both sources came to a conclusion that offered a wide but similar range in fuel consumption.

**Chapman Technical:** Estimates fuel consumption would be between 12,000 and 24,000 gallons a day.

**Chief Engineer Chuck Cart:** Estimates fuel consumption would be between 11,729 and 23,510 gallons a day.

Averaging these four numbers provides a reasonable estimate for fuel consumption, while taking into account that the Badger's boilers were designed to burn coal, not diesel (tube spacing and combustion area are different in boilers designed to burn #2 diesel). Estimated gallons of #2 diesel that would be burned per day: 17,809.75. Fuel is averaging around \$3.25 a gallon. Daily fuel cost at that price would be approximately **\$57,881.68 per day**.

Using the best case scenario of 11,729 gallons of fuel per day, our fuel cost would be  $(11,729 \text{ gal} * \$3.25 = \$38,119.25)$  **\$38,119.25 per day**. Our current coal fuel cost is in the \$8,400.00 per day range.

Based on the best case scenario for fuel consumption and an approximate sailing season of 140 days, the increase in annual fuel cost would be **\$4,160,695.00** ( $\$29,719.25 * 140 \text{ days} = \$4,160,695.00$  per year).

This increase in fuel cost does not take into account the cost of the boiler conversion.

Note: heavy oil / bunker type fuels are rapidly being phased out through the regulatory process and soon will be unavailable; as such, they were not included as an option.

## Chuck Leonard

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**From:** LMC-marine shop [engineering@ssbadger.com]  
**To:** cleonard@pmship.com  
**Subject:** Fuel consumption

Chuck,

I spoke with John Chapman this afternoon at 2:45 concerning data needed for estimating fuel consumption for BADGERs boilers if fired on MDO. He indicated that the figures I had been able to generate were garnered in the same manner as he was using and would be as valid as any he could provide with the information available to us at this time. The are;

from Foster-Wheeler Performance Data Steamers 42-43  
@ 29,500 #/hr normal steaming rate  
furnace volume of 880 cuft  
BTU liberation per cuft of 49,350  
for 24hrs  
times 3 boilers  
 $49,350 \text{ btu/cuft} \times 880 \text{ cuft} \times 24 \text{ hrs} \times 3 = 3,126,816,000 \text{ btu/day}$   
divided by the EPA average heat value of No. 2 marine diesel of 133,000 btu/gal  
gives an estimated fuel usage of  
23,510 gal/day

or

assumed average coal consumption of 60 ton/day  
2000#/ton  
13,000 btu/#  
 $60 \text{ ton} \times 2000 \text{ #/ton} \times 13,000 \text{ btu/#} = 1,560,000,000 \text{ btu/day}$   
divided by 133,000 btu/gal  
gives 11,729 gal/day

John also estimated \$140,000 in equipment needs to install an oil burner system on four boilers, after speaking together we agree that with necessary modifications to the boiler fronts and related brick work this cost could exceed \$200,000 very easily.

If you have any questions let me know.

Chuck C.

## **Chuck Leonard**

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**From:** John Chapman [john@chaptech.us]  
**To:** 'Chuck Leonard'  
**Subject:** Fuel Oil Fired Boilers

Chuck.

To reiterate my continued conversations with Chuck Cart and our combined estimates for re-outfitting the boilers with F.O. burners, we estimate the following:

Estimated cost to change out burners, install new F.O. tanks, install related piping systems, engineering and approvals is approximately \$250 – 260K

The estimated fuel consumption has a broad range depending on the approach used. The least amount estimated is about 12,000 gal/day and the most was estimated at about 24,000 gal/day.

Chuck Cart told me that he would take time to review the estimates with you but if there is anything I can answer or assist with please let me know.

Regards,  
John

**John A. Chapman**

**Chapman Technical**  
**185 E. Walnut Street**  
**Sturgeon Bay, WI 54235**  
**Cell (920) 883-2132**  
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## Chuck Leonard

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**From:** Pamperin, Michelle [MPamperin@usoil.com]  
**Subject:** US Oil Firm Fixed Pricing

US Oil Firm Fixed Pricing

ULS #2

Feb 12	\$3.2140
Mar 12	\$3.2321
Apr 12	\$3.2961
May 12	\$3.3007
Jun 12	\$3.2798
Jul 12	\$3.2895
Aug 12	\$3.2905
Sep 12	\$3.3165
Oct 12	\$3.3236
Nov 12	\$3.2942
Dec 12	\$3.3116
Jan 13	\$3.3353
Feb 13	\$3.3133
Mar 13	\$3.2764

\*Price is the market close only and may not reflect the true cost of the contract. Please check with US Oil for current price

\*base price only FOB terminal and does not include any freight, inspection fees or taxes

\*Contracts are done on clear fuel. Dyed fuel and Premium diesel may be applied to the contracted gallons at the current applicable rates. Currently .0035 for dye and .02 for PDF.

### Michelle Pamperin

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