



2505 Second Avenue  
Suite 602  
Seattle, WA 98121  
Phone: (206)284-5900 x2504  
(800)708-8525  
James Kross

## **Ultra Low Emission Vessel Fuel For Use in Ocean Going Vessels In California**

### **Background**

In 2008 the IMO, EPA and CARB all set in motion extensive new regulatory programs designed to reduce emissions from marine vessels in CA ports. Consequently, over the next 11-years emissions of sulfur dioxide, particulate matter and nitrous oxides and eventually CO<sub>2</sub> will be reduced dramatically. The impact of these new rules will be most striking for internationally flagged Ocean Going Vessels (OGV) operating in US waters. Various techniques have been approved to reduce vessel emissions including using cleaner fuels and installing emissions abatement technology.

**Biofuel:** Reducing emissions from diesel engines by lowering the fuel sulfur content has been the mainstay of emission abatement for diesel vehicles for decades. CARB has chosen this same approach to achieve a rapid reduction in emissions from OGV's in state waters. In 2009, it will implement a rule requiring that all vessels entering California ports must burn distillate fuel. By 2012, the sulfur content of the fuels may be no more than 1,000 ppm. By 2015, the proposed EPA Emission Control Area (ECA) stretching from Alaska to Mexico will also require fuel with no more than 1,000 ppm sulfur.

Our firm recently developed an advanced biofuel specifically for use in slow and medium speed marine diesel engines, to meet the CARB requirement. Designated MBF100, it is made from virgin materials that are not food products or derivatives and can be profitably marketed at the same price point as competing petroleum distillates such as Marine Gas Oil (MGO). Energy values per metric ton are similar to MGO but emissions are significantly less: SO<sub>x</sub> < 5 ppm, hydrocarbons 65% less, Particulate Matter 50% less than what is produced by distillates, and a large reduction in CO<sub>2</sub>; significantly lower emissions than when burning MGO. If all OGV's entering California used this biofuel it would eliminate some 6,000 tons of SO<sub>x</sub> from the LA basin annually. MBF100 can be transported, stored and delivered the same as bunker fuels.

**Biofuel and Vessels:** Using MBF100 can be an attractive option for vessel owners. It is specifically formulated for slow speed marine engines as a low emission, one-for-one replacement for heavy fuel oil. No changes to the ships fuel system or the engines on the vessel are required. As with heavy and intermediate fuel oils, MBF100 must be maintained at a temperature above 40<sup>0</sup>C. Major manufacturers of slow and medium speed engines have conducted extensive evaluations of biofuels and approve them for use in their engines.

MBF 100 will be introduced in San Pedro Bay ports in 2009.

**Table I: Emission Comparisons**

**MGO to MBF100**

<u>Fuel</u>	<u>Emission Parameter</u>	<u>Diesel Engine Emission</u>	
		<u>Reduction</u>	<u>Concentration</u>
<u>Distillate Fuel</u> <b>MGO</b> 0.10% Sulfur	SOx	90%	1,000 ppm
	All types of Particulate Matter	10%	
	Nitrogen Oxides (NOx)	5%	
	Hydrocarbons (HC)	10%	
	Carbon Dioxide (CO <sub>2</sub> )	0%	
<u>Biofuel</u> <b>MBF100</b> 0.0% Sulfur	SOx	99.99%	< 5 ppm
	All types of Particulate Matter	>50%	
	Nitrogen Oxides (NOx)	up 3%	
	Hydrocarbons (HC)	>60%	
	Carbon Monoxide	>40%	
	Carbon Dioxide (CO <sub>2</sub> )	>50%	