

## Advantages of Low Sulfur Oilheat

The first reason is to reduce air pollution. About 99% of the burned sulfur becomes SO<sub>2</sub> - a PM 2.5 fine particulate pollutant. It irritates lungs, contributes to pulmonary disease, and creates haze. Half of that is PM 2.5 and is vented from the heating system. The rest of the SO<sub>3</sub> combines with water in the combustion gasses to create sulfuric acid. At about 220 degrees F sulfuric acid starts to condense on heat exchangers and venting systems and turns into iron sulfate scale. Switching to ULS eliminates 99.5% of PM 2.5 emissions and eliminates scale deposits totally.

The most extensive testing for Ultra Low Sulfur fuel in the United States was done by Brookhaven National Laboratory on behalf of NYSERDA.<sup>1</sup> They found that 500 ppm leads to very clean heat exchangers; 15 ppm leads to totally clean heat exchangers. During the testing they also found that removing the sulfur from the fuel also improves fuel thermal and storage stability. The hydro desulfurization process converts some unstable, unsaturated double bond hydrocarbon molecules into saturated bonds that are more stable. Sulfur in fuel also increases oxidative degradation and the formation of sludge. Sludge has higher sulfur content than the base oil. Finally, the process that removes sulfur also reduces fuel bound nitrogen, which in turn reduces NO<sub>x</sub> emissions.

### Low Sulfur Summary

- Eliminates scale build-up in heat exchangers caused by condensing on start-up and during the run-cycle on high efficiency equipment. This reduces efficiency degradation through the heating season.
- Reduces service time and therefore cost during the tune-up.
- Increases the life of the heat exchanger and venting components.
- Eliminates SO<sub>x</sub> emissions and fine particulate emissions.
- Improves storage and thermal stability of the fuel.
- Enables condensing heat exchangers, wall hung boilers, and more aggressive tune-up standards that increase efficiency.

Perhaps the best reason to lower the sulfur levels is that it will enable relatively low tech, inexpensive, reliable condensing technology that will increase Oilheat's AFUE ratings by the 6.5% currently lost as latent heat. Currently we have a few very good condensing units, however they are expensive because of the cost of the high quality steel required to make a heat exchanger that can stand up to the sulfuric acid. Ultra low fuel will enable us to produce a wide variety of competitively priced condensing appliances with AFUE ratings above 90%.

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<sup>1</sup>Paper No. 06-03. "Benefits and Advantages of Marketing Low Sulfur Heating Oil Including Results from a New York State Low Sulfur Market Demonstration." Brookhaven National Laboratories. Retrieved from: <https://www.ecvt.net/assets/files/Brookhaven-Low-Sulfur.pdf>