Santa Barbara County
Air Pollution Control District

FAQ:	Technical Information and References
DATE:	October 10, 2016
REV:	2.0

Fuel Heat Content

Q: *How many BTUs are there in a therm?*

A: There are 100,000 British Thermal Units ("BTUs") per therm. A therm is a unit of gross heating value.

Fuel Heating Value Conversion

Q: *How do I convert from Lower Heating Value (LHV) to Higher Heating Value (HHV) based emission factors?*

A: For gaseous fuels multiply the LHV value by 1.10 and for liquid fuels multiply the LHV value by 1.06.

Sulfur Specifications

Q1: *What are the sulfur specifications for PUC Quality natural gas?*

A1: The Public Utilities Commission of the State of California has issued General Order 58-A titled "Standards for Gas Service in The State of California" (last revised December 16, 1992). Title 7 (Purity of Gas) of the General Order specifies hydrogen sulfide and total sulfur standards for any gas supplied by a utility. Section (a) limits hydrogen sulfide to 0.25 grain per 100 standard cubic feet. Section (b) limits total sulfur to 5 grains per 100 standard cubic feet (which is equivalent to 85 ppmv as S or 80 ppmv as H2S).

Q2: *What are the sulfur specifications for propane?*

A2: The Gas Processors Association ("GPA") provides product specifications for liquefied petroleum gases. These specifications may be found in Figure 2-1 (GPA Liquefied Petroleum Gas Specifications – GPA Standard 2140-92) of the Engineering Data Book (10th Edition, 1994) published by the Gas Processors Suppliers Association. Total sulfur standards are provided in units of ppmw. For commercial propane, the standard is 185 ppmw as S (254 ppmv as S, 239 ppmv as H2S).

Boiler Rating Conversion

Q: *How do I convert a boiler rating from units of boiler horsepower (bhp) to heat input (lb/MMBtu)?*

A: This conversion requires two steps. First the boiler horsepower value is converted to an energy basis by multiplying by 33,446 Btu/hr per Bhp. Since Bhp ratings are based on the amount on useful work a boiler performs, the efficiency losses in converting the heat input to this useful work must be accounted for. In general, a boiler is about 80 percent efficient in converting the fuel's energy into useful work. Thus, the "Btu/hr" value must be corrected to account for the 20 percent loss.

Example: 500 Bhp = 20.904 MMBtu/hr (500 bhp * 33,446 Btu/hr/Bhp * 1/0.80).

Generator Rating Conversion

Q: *How do I determine the rated-horsepower (hp) of my generator engine if all I know is the rated kW value?*

A: There are two types of kW numbers. One is called the mechanical kW (kWm) and the other is the electrical kW (kWe). Engine manufacturers and generator suppliers do not always state which one they are using and this can lead to confusion in determining the rated horsepower (hp) of the IC engine. The kWm is the mechanical power driving the generator. It is determined by multiplying the rated horsepower of the engine by the conversion factor of 0.7457 (1 hp = 0.7457 kWm). The electrical kWe is the actual useful power available to the end user and takes into account power losses due to the efficiency of the generator as well as fan power needs. These losses are engine specific, and 15-20 percent efficiency loss is not uncommon. As a result of accounting for the efficiency loss, the kWe value is always less than that of the kWm. Common kWe values can range from 80-85 percent of the kWm value. Older generators are often less efficient than newer models and therefore would be closer to the 80 percent end of the range.

Example: A Generac SD030 standby generator is rated at 30 kWe by Generac. This generator is powered by a Deere 4024T diesel engine. The rated horsepower of the Deere engine in standby operations is 48 hp (with a 36 kWm rating). If the only generator information available was the 30 kWe rating, the engine's hp could be estimated by:

Est. engine hp = (rated kWe) * (1/efficiency) * (hp/0.7457 kWm)
= (30 kWe) * (1/0.84) * (hp/0.7457 kWm)
= 48 hp

In this case, the engine is new; therefore, a higher efficiency (i.e., lower power loss) is assumed. This estimation calculation is only required if the engine specific data is not available.