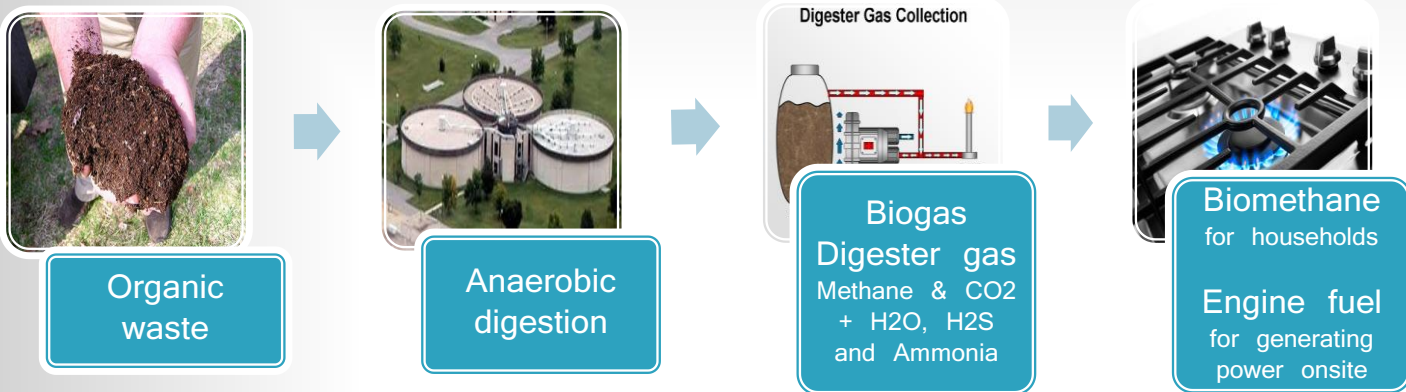


AIR QUALITY TESTING SERVICES FOR DIGESTER GAS-TO-PIPELINE PROJECTS

Anaerobic digestion of organic waste produces large amounts of gas (Biogas or Digester gas) composed mostly of methane and CO₂, with smaller amounts of water and other gases including possibly hazardous and odorous chemicals like H₂S and Ammonia.



In the U.S., a lot of Biogas is burned in flares as waste gas, while some is used to fuel engines to generate power onsite. Raw Biogas can be processed to remove harmful contaminants to make pipeline quality Biomethane, which is then sold to utility companies to be used as fuel in households. AAC has been working with several of our clients to test Biogas and Biomethane for a variety of constituents to ensure that the end product contains acceptable BTU levels and is safe for household use.

Currently, the three largest sources of Biogas-to-Pipeline Biomethane in the U.S are Landfills, Dairies, and Sewage/Waste Water Treatment plants. There are over 60 Biogas-to-Pipeline gas projects nationwide, most of which are made up of landfills and sewage treatment plants and one which is a dairy project. While the Biogas composition from each source and even from each specific location can be significantly different, the resulting Biomethane should meet similar contaminant standards.

California Regulations

Several California utilities have passed regulations regarding the specifications and allowable contaminant levels for Biomethane, including SDGE (Rule 30) and PG&E (Rule 21). The state of California recently passed AB 1900, which sets new limits for the entire state on allowable contaminant levels in Biomethane in order to protect human health and ensure pipeline safety (See Table 1). Testing is required prior to introduction of Biomethane into the pipeline and at least once per year thereafter, depending on the initial results.



Atmospheric Analysis & Consulting, Inc.
Air Quality Laboratory
www.aaclab.com

Research and Development

Prior to AB 1900 passing, we worked with one of our clients to identify the constituents and possible contaminants of raw Biogas, as well as treated Biomethane coming from the digester of a large Waste Water Treatment Plant (WWTP).

We were tasked with reviewing data and researching available methods to test for various contaminants in Biogas. We also advised which analytes to test for and which methods to use. By collaborating with several other labs, we were able to combine our analytical expertise to analyze a large list of possible contaminants. The methods that we chose (see Table 2) were then used to collect and analyze samples from raw Digester gas, from treated Digester gas, and from the Tail gas. Collection and analysis of samples were conducted at least once a month and continued for a one year period. The approximately fifteen methods were modified as needed in order to achieve acceptable reporting limits and to address any sampling problems that arose (mostly due to excessive loadings and/or moisture in the raw Biogas samples).

Table 1. AB 1900 Biomethane Contaminants and Testing Methods

Analyte	Method	Analyte	Method
Hydrogen Sulfide, Total Mercaptans, Total Sulfur	ASTM D-5504, etc.	n-Nitroso-di-n-Propylamine	EPA 8270
p-Dichlorobenzene, Vinyl Chloride, Ethyl benzene ,and Toluene	EPA TO-15	Lead, Antimony, Arsenic, Copper	EPA 29
Methacrolein	EPA TO-11A		

Table 2. Digester Gas Analytes and Testing Methods

Analyte	Method	Media
Heating Value	ASTM D3588	Tedlar Bag
Major Components: C1 to C6+, CO2, N2, O2, CO, H2		
Hydrogen Sulfide, Mercaptans and Total Sulfur	ASTM D-5504	Tedlar Bag
VOCs, Halocarbons, and Vinyl Chloride (TO-15 List)	EPA TO-15	Tedlar Bag
Siloxanes	EPA TO-15M	Tedlar Bag
Aldehydes and Ketones	EPA TO-11A	DNPH tube
Volatile Fatty Acids	EPA TO-17M	Silica Gel Tube
Ammonia	EPA CTM-027	0.1N H2SO4
PAHs and SVOCs, including Nitrosoamines	NIOSH 5515M/ EPA 8270M	Filter/ Sorbent Tube
PCBs as Congeners	NIOSH 5503M/ EPA 8082	Filter/ Sorbent Tube
Pesticides/Herbicides	NIOSH 5600/5601M EPA 8081M	Filter/ Sorbent Tube
Mercury	ASTM D5954	Gold Beads
Particulate Matter	EPA 5	Filter/Impinger
Volatile Metals (EPA 29 List)	EPA 29M	Solutions



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www.aacalab.com

Please contact AAC for any additional information on Digester Gas sampling and analysis methods
 Email: info@aacalab.com

