TECHNIQUES OF COMPOSITE SAMPLING

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The most important thing in taking a sample is where and how it is taken. A sample can be taken as a spot, composite, or as a continuous sample connected to a chromatograph.

WHERE SHOULD A SAMPLE BE TAKEN?

A sample should be taken on the longest piece of pipeline available. Unfortunately this is usually a meter tube. Not that this is a bad place to take a sample but swirls can be created inside a meter tube. This can cause the flowing stream to create aerosols from the liquid collecting on the walls of the pipeline. The aerosols can be picked up by the sample causing a higher BTU reading.

SHOULD I USE A SAMPLE PROBE?

All samples should be taken through a sample probe. A sample probe is usually a valve with a piece of tubing welded to the bottom of it.

There are many different probes on the market today. There are single flow probes, dual flow probes and hot tap insertion probes. Whichever probe you use, the most important thing to remember is to make sure the tip of the probe is in the center 1/3 of the pipeline. Probes that are too close to the walls of the pipe can pick up liquids. When placing a probe on a multiple meter tube station, make sure you place the probe on the tube that will be flowing all the time. Do not use a probe on a header, headers create swirling gases and dead gas pockets, they are not a good choice for taking a sample.

Now that you have placed your probe in the pipeline you are ready to take a sample.

COMPOSITE SAMPLING

Composite sampling is the most representative form of taking a sample. A composite sampler takes a small bite of sample from the pipeline and injects it into a sample cylinder. If the sampler is connected to a flow computer it is possible to take samples proportional to flow. This means that if the flow rate goes up the sampling rate will increase, if the flow goes down the sample rate will decrease. The most important thing to remember when taking a sample from a flowing stream is that all sampler components must be above the Hydrocarbon due point. "API 14.1" If any component of your sampling system is below the Hydrocarbon due point the Heavy components of the sample will liquefy and drop out usually causing a lean sample result. Refer to API 14.1 for further explanation of this problem.

SAMPLE CYLINDERS

There are two types of sample cylinders on the market today. The spun-end bottle and the constant pressure cylinder. The spun-end bottle is made of stainless steel or aluminum. The bottle usually has a 1/4″ NPT connection at each end for valves. If the bottle is longer than twelve inches or greater than four inches in diameter, DOT requires that a relieving device be installed on the cylinder. This is to protect the bottle from over-pressuring. When sampling into a spun-end bottle it is recommended that the bottle be placed in the vertical position. This will prevent the settling of heavy gases during the purging process. Purge the cylinder by using the procedure stated in GPA 2166-68, "Methods for Obtaining Natural Gas Samples for Analysis by Gas Chromatography."

1. Remove plug or cap from outlet valve or cylinder.
2. Close sampler bypass valve.
3. *Slowly* open outlet valve and observe decrease in pressure on sample gauge.
4. Close outlet valve on sample cylinder just before pressure reaches zero.
5. Open sampler bypass valve, allowing cylinder to be filled with line pressure.
6. Repeat steps 2 - 5 the number of times shown on the table below, depending on the pressure used for purging the cylinder.

Pressure used for Purging Cylinder	Number of Purge Cycles
15-30	13
30-60	8
60-90	6
90-150	5
150-500	4
> 500	3

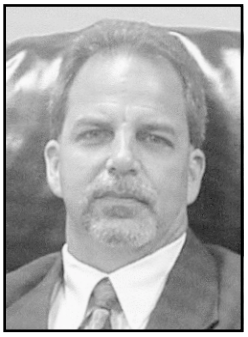
7. On the last purge cycle, do not fill sample cylinder again. Instead, leave it pressurized a little above zero.
8. Install plug or cap in outlet valve of cylinder.

After completing the purging process you will need to place the sampler into service.

If the BTU value is greater than 975 BTU you may want to consider using a constant pressure cylinder. If your BTU IS 975 or greater, and you are injecting into a spun-end bottle, you may be having a flashing problem. If you start off with atmospheric pressure in the cylinder and build to pipeline pressure. The chain of molecules can change at different pressures; we call this flashing. When building pressure in a sample cylinder that starts at atmospheric pressure, it is possible for some of the molecules to change state (flash) as the pressure builds. Because this happens the sample may not be representative to the pipeline gas. By using a constant pressure cylinder the gas in the cylinder, as well as the gas being sampled, will stay at pipeline pressure. This will keep the gas from flashing or changing phase.

ANALYZING THE SAMPLE

After the sample has been taken it will be transported to a lab for analyzing. Remember all samples being transported under pressure must meet and comply with DOT certification. When preparing the cylinders for drawing off the representative sample there are some things to consider. When using a spun-end bottle you will need to heat the cylinder so that any hydrocarbons that might have liquefied will turn back into a vapor. When using a constant pressure cylinder you will need to apply pressure to the precharged side equal to the bottle pressure, so that when the sample is being drawn off the pressure will remain at pipeline pressure. The other thing to consider is your lab. If you are using your own lab you are probably using a calibration standard that is close to your pipeline gas. If your are using a contract lab it is recommended that you check their standard. If the calibration standard is missing some of the properties that are present in your gas, you may not get a representative BTU of your pipeline gas. By using the procedures above you have a good chance of obtaining a representative sample of your pipeline gas.



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