

## Natural Gas Measurement

### **Why should I as a mineral owner be concerned with measurement? How does meter test frequency affect my royalty payments?**

In this article we will discuss several things including the use of chart recorders versus the electronic recording device (ERD). Most in the industry maintain that the ERD is without a doubt more accurate than the chart recorder. However, what needs to be focused on is that any measurement device regardless of brand or type is only as accurate as the individual maintaining the device and the test equipment (referred to as “standards”) being used to calibrate the three components used in the gas flow equation which are differential pressure, static pressure, and flowing temperature. Fair royalty payments are the byproduct of accurate measurement and proper accounting based on the applicable oil and gas lease language. It takes both to insure you as a Royalty Owner are being compensated fairly for the oil and gas being produced on your leases.

First let’s break down the components of the typical orifice metering system. The meter tube and orifice plate, often referred to as the primary element, are both precision machined bored to close tolerances. For every different size orifice plate that can be installed in varying sized meter tubes, there are different factors called orifice factors. These orifice factors are one of many utilized in the gas flow equation. The recording device, usually a chart recorder or an ERD, is referred to as the secondary element.

Now, let’s discuss the debate concerning the accuracy of the chart recorder versus the ERD. The ERD is often inappropriately called an electronic flow meter. First and foremost, one must understand that both a chart recorder and an ERD require a primary element which in simple terms means that the ERD is not a complete replacement of the old chart recording system. The ERD is simply a significantly improved device that stores data and automatically computes flow volumes. If appropriately maintained, an ERD that has had accurate information installed pertinent to that specific flow stream will compute more accurate volumes than the chart recorder. In essence, the ERD eliminates the human element of chart integration that is required when charts are used. Keep in mind that the primary element (meter tube and orifice plate) must still be inspected, tested routinely, and maintained for the ERD to produce accurate data.

### **The HEART of Gas Measurement**

While there are a multitude of components and factors responsible for precise measurement including gas gravity, flowing temperature, different pressure, and static pressure among others, the orifice plate is arguably the most important component of the primary device and perhaps the most critical piece of equipment in the metering system. Almost all things that occur with orifice plates including nicks occurring on the opening surface, plates getting dirty or having carbon deposits accumulate, plates wearing, plates getting bent as wells are opened abruptly, and even plates installed backwards, contribute to under measurement or under calculation of volumes. Consequently, orifice plates must be inspected regularly. Verification of the orifice bore by means of a precision device called a caliper is necessary at initial installation and each time the plate is inspected

thereafter. Additionally, meter tubes should be inspected after years of flow. Inspection frequency should be based on gas quality and volume taking into consideration other things such as sand and liquid production that may create additional wear or pitting on the internal surface of the meter tube. **If the meters aren't being tested routinely by the Operator, you can rest assured orifice plates aren't being inspected regularly either. This can result in the Royalty Owner being shorted.**

Neglect or infrequent testing almost always impacts measurement negatively, sometimes resulting in both the Operator and Royalty Owner being shorted, but that depends on the facility layout and how many meters are installed in the system by the Operator. Unfortunately, in many cases the Royalty Owner is compensated via a meter(s) other than the meter the Operator receives payment on. What I find routinely throughout south Texas field operations is that the meter(s) the Operator is compensated on, which is typically the Sales meter operated by the pipeline company and is either the last meter in the system on the lease or is located off lease, is tested monthly. Conversely, many allocation or well meters located upstream, that the Royalty Owner is compensated off of, are tested less frequently. Operators offer various reasons, but the most common excuse is that they don't have the staff to test all of the well meters monthly. Many Operators employ a meter test frequency based on volume and most don't test monthly unless the well produces 1000 Mcfd or more. Some Operators test monthly only until the well declines to 5000 Mcfd. Let's explore what that really means. What is being conveyed here is that the flow stream you are being paid royalties on isn't important enough to warrant monthly meter tests unless that flow stream is valued at more than \$240,000 (\$8 gas x 1000 Mcfd x 30 days). Doesn't exactly make economic sense to you as a Royalty Owner does it!

### **Lease Language Tip**

In your oil and gas lease negotiations, make sure meter test frequency is specified. Ask for monthly meter tests for any meter related directly or indirectly to royalty payment calculations. Settle for quarterly tests if you must or negotiate test frequency based on flow stream value or volume. For example, you might ask for monthly meter tests for all wells producing greater than 500 Mcfd so long as the gas is valued at \$5 or more. If you do not specify meter test frequency, please understand that there is a good possibility your Operator is only going to test the meters you are being paid royalties on either semiannually or annually and that should be unacceptable to you.

Natural Gas Measurement is a rather complex issue. Future articles will discuss the many factors and components associated with the gas flow equation including BTU issues as well as other field operations issues and challenges from the perspective of TR Measurement Witnessing, LLC. Terry Retzloff ([terryretzloff@sbglobal.net](mailto:terryretzloff@sbglobal.net)) is a former Oil Company employee that now owns and operates TR Measurement Witnessing, LLC – a company that provides services and educational opportunities primarily to Texas mineral and royalty owners.