

Title: Finding Unaccounted for Gas by E.L. Upp

FINDING UNACCOUNTED FOR GAS

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Introduction

Unaccounted for gas loses money. The purpose of business is to make money. How do we find gas that is being lost? This question is becoming more prevalent in the gas industry as profits have been squeezed in recent years. In a number of the companies in the business their losses of gas are increasing. In addition, Federal Energy Regulatory Commission (FERC) has taken the cost of these losses directly to the bottom-line.

Unaccounted for Gas

At one time, gas was actually lost through leaks in pipelines. This was years ago when cast iron pipelines with bell and spigot type joints were used for low-pressure manufactured gas distribution. Because of the porosity of the cast iron and the lack of sealing of the bell and spigot joints, leakage was significant. Allowances were made for this gas that was an unmeasured loss. It was a part of the economic calculation of the pipeline operating costs.

However, with the conversion to natural gas, high-pressure gas production and long distance pipelines, leaks were found because of the high velocities and noise, which accompanied them. Other than very small leaks such as valve packing, pinholes, intentional blowdowns and instrument gas leakage, most unaccounted for gas is caused by limitation of flow measurement accuracies because of poor application, operation and maintenance. Under the best of circumstances all flow measurement has uncertainties that do not allow 100% accuracies. Thus, we always have a problem of controlling the loss and unaccounted for all gas measurement.

Where do we Find These Measurement Uncertainties?

The first problem is to determine whether there is a problem of significance or whether they fall within the "expected limits". What are expected limits? There are two sources that define limits. The past history of a given company's measurement balance reports and the experiences of similar operating company's balances. Depending on the complexity of a system and the flow measurement complexities involved this can vary from ± 0.1 to 0.3% for large pipeline companies to ± 3.0 to 10% for production field balances. Distribution companies usually fall somewhere in between these limits. Since all unaccounted for gas is lost revenue, there are economic reasons for looking for it within the parameters of the cost versus the savings. The estimated savings are dependent on finding the source of the error. These can be quite small and are not always easily found.

The manner of establishing the magnitude of any potential savings is initiated by reviewing historical data. This begins with a review of the Loss and Unaccounted for report (L&U) or a similar volume balance studies. Small changes or constant increases are cause for concern and should be checked for causes.

Once this data is reviewed for inconsistencies a basis on those suspected stations can be made with visits to stations and the review of more detailed data and calculations.

To choose meters a review of the following data should be collected and analyzed.

1. Meter

- a) meter (number and location)
- b) volumes measured at each (range and total)
- c) measurement variable
- d) types
- e) readout system
- f) accuracies expected
- g) range
- h) station design and installation
- i) operating procedure
- j) maintenance procedure
- k) fluid condition
- l) calibration test
- m) maintenance

2. Information Flow

- a) field
- b) communication
- c) office
- d) accuracy checks at each point

The study of these meters should be in order of the volumes being measured with the higher volume meters done first. Quite often as low as 10 to 20% of the meters measure up to 90% of the total flow. A 0.1% error is equal to \$10,000 per day for gas that sells for \$2.00 MCF/day on a station handling 500,000 MCF/day. On the other hand, the same error on a volume of 50 MCF/day is \$1.00. For larger errors of 5, 10 or 20% range the economics kicks in at some of the lower volume meters. This approach allows planning a program that has the best chance of finding unaccounted for gas that has economic significance to your company.

Once a problem station is identified, complete examination of the station should

be made including:

1. Meter and meter installation meets industry standards and/or company standards.
2. Gas quality meets contractual requirements with no carry over of solid or liquids.
3. Inspection of meter tube, secondary (transducers) and tertiary equipment (computers) to confirm they meet standards and then a thorough test report review.
4. Maintenance procedures checked for reoccurring calibration problems.

The foregoing are the major sources of measurement problems that cause unaccounted for gas. These field problems have increased in recent years because:

1. Maintenance and testing (time and personnel) have been reduced with budget reductions.
2. Auditing of the whole measurement process has been reduced to a minimum if it is done at all.
3. Management is reluctant to spend money unless they can be guaranteed a return on investment of some set percent (i.e., 15 or 20%). Putting definitive numbers on flow measurement errors is at best an estimate.
4. A great deal of upper management's experience is not in operations and they don't really understand the flow measurement problem.

If you want to find unaccounted for gas most will be found in field measurement problems. The solution to the problems will cost short-term expenditures, but will result in long term income.

It's a bit daunting to convince management that is not looking beyond the immediate profit and loss report to a long-term investment of time and money.

These solutions have been known to the gas industry for 50 years, but the gas business has changed. If you want to find your unaccounted for gas, go back to basics for good measurement. It will pay dividends for your company. There isn't any "silver bullet"; finding L&U requires a lot of hard work. Work that will pay off in increased income.