COMMUNICATION BETWEEN THE OFFICE AND FIELD

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Introduction

Transferring the knowledge base regarding the measurement equipment between a field measurement technician and a corporate measurement analyst can be extremely challenging. A Field technician's skill set is tested on a routine basis; therefore, the technician must be knowledgeable in:

- electronic controls to pneumatic controls
- communication system support
- multiple disciplines
- support of measurement equipment
- procedures that must be followed
- regulatory requirements governing the facilities
- ongoing training of field personnel

Each organization is constantly facing challenges due to these factors as well as many others.

Evaluating periodic data, testing, and calibration procedures requires two different skills sets depending on if you are a field technician or a cement analyst. The task for the measurement analyst is to absorb the wealth of information presented, and utilize their extensive knowledge base in order to determine when a current month adjustment or even a prior month adjustment is warranted.

Past to Present

Previously, all major companies staffed their own measurement training facility. A company would provide the training at regularly scheduled intervals throughout the year. The training would often take place at a live gas facility and might include videos, classroom training sessions, and hands-on field training. Each organization had their own set of Standard Operating Procedures (SOP) and the appropriate AGA, API, and GPA documents. The procedures in each document were taught, demonstrated, and executed by all measurement technicians. Each SOP had a standard form which outlined the procedure on how to successfully document the gas measurement data. Every measurement technician was cycled through multi-level training classes. Upon completion of each measurement level, the technician received a certificate and sign-off.

By the mid to late 90s, FERC636, deregulation, and major corporate organizational changes resulted in the discontinuation of the majority of the company-staffed measurement training facilities. Many companies experienced major SOP modifications and consolidations. During that time period, consolidation forced the "retirement" of a significant portion of the industry's gas measurement professionals and their associated experience. Fortunately, the prior training investment was able to sustain the industry's needs for several years.

Presently, new measurement technicians being hired do not have the benefit of the training and understanding their predecessors received. The bar has been raised as new measurement technicians require computer skills and operations knowledge for the never-ending list of new equipment. In addition, the Operator Qualification program has made a significant impact on required documentation and sign-off for new and existing measurement personnel.

Training

Training has become even more critical with the consolidations and heavy turnover that numerous production and pipeline companies have experienced over the past few years. Effective communication depends on a common vocabulary.

Below is a list of terms to be familiar with in order to communicate effectively between the office and field:

- Plate Size
- Tube ID
- Beta Ratio
- Flange Taps vs. Pipe Taps
- Mercury / Dry / EFM Meters
- Differential Pressure Range
- Static Pressure Range
- Temperature Range
- Actual / Square Root / Percentage Charts
- Orifice Metering and AGA 3
- Turbine Meters and AGA7
- Positive Displacement Meters and AGA 7
- Ultrasonic Meters and AGA 9 and AGA 10
- Coriolis Meters and AGA 11
- AGA 8 - Compressibility Factors of Natural Gas
- API 21.1 – Electronic Gas Measurement
- Positive Displacement / Turbine / Ultrasonic Meter Multipliers
- Mcf / MMcf / MMbtu / Dth
- Absolute vs. Gauge Pressure
- Typical standard units of measurement
- Current Industry Standards
- Overall Measurement Accuracy
- Gas Sampling (Include Safely Transporting Gas Bottles/Samples)
- Chromatograph
- Specific Gravity Determination
- Determination of Moisture Content
- Automatic Control of Flow and Pressure
- Control Valve and Regulator Equipment
- Odorization
- Supervisory Control and Data Acquisition (SCADA)
- Corrosion Control and Cathodic Protection in Pipeline Operations
- Communication Techniques
- Safety Issues

A clear understanding of these terms between both parties can eliminate many mistakes and corrections in the measurement department. A good example of an error is when flange taps and pipe taps get coded incorrectly in a measurement system. The incorrect coding can result in an 8% adjustment to the volume. This costly mistake clearly demonstrates the importance of thorough training.

Who Is Responsible

Most companies have a higher turnover rate than ever before. Therefore, it is becoming more difficult to keep up with and identify the responsible parties in key areas of gas measurement. The best way to solve this problem is to identify who is responsible for each specific area.

Who handles:

- Gas Quality Sampling Issues – Lab, Measurement Technicians
- New Station Turn-Ons – Measurement Technician, Measurement Analyst, Production Accounting/ Marketing Operations, Marketing Sales, Regulatory Affairs, Gas Control, Engineering
- Chart Meter Problems – Area Technicians, Chart Changer, or Third Party Service Company
- EFM Meter Problems - Area Technician

- EFM Meter Communication Problems – Area
- Technician or Communications Technician
- Ordering Charts
- Etc.

Charts

The best way to communicate on chart-based meters is by using the chart itself. Most questions that originate from the office could be answered before they are asked by the measurement technician and/or chart changer. Simply detailing key events of what happened on the chart can prevent the majority of questions.

- Back-Flow situations should always be noted around the hub of the chart.
- Liquid in the meter should also be noted around the hub or under remarks on the back of the chart.
- Whenever a meter is zeroed or tested and the pens are recording low or high this should be noted under the remark's section on the back of the chart.
- Low flow or no flow should be noted in the remark's section especially if this is a station that may be hard to distinguish between the two. There is a significant difference between low flow and zero flow.
- Actual chart changing time (placed and removed) should be recorded on the chart.
- Any clock problems (slow, fast, stopped) or hub problems (loose, too tight) should be noted under remarks.

EFM

Electronic Flow Measurement (EFM) requires almost immediate response for resolving measurement issues between both the office and field locations. Frequently, the volume received on an hourly basis from the field RTU for a pipeline company is being posted on the Internet for customers to review almost instantaneously**.** Each company should have their own method to resolve the identified exceptions and minimize the resolution time effect to all internal and external customers.

EFM problems can be easily identified by reviewing an exception report or a graphical view of the exceptions. Exception reports summarize errors and potential problems that have occurred during the requested date and time. The primary focus is on the previous and current gas day for all meters and critical volume calculation components. Validation criteria can be defined for each meter. Analysts must rely on raw data, audit trails, prior meter history, check measurement, and information from the measurement technician in order to troubleshoot and resolve potential problems.

Trying to communicate between the field and office can sometimes be difficult even with the many methods of communication that exist. Timely communication whether it is via telephone, fax, or e-mail, is required to meet the demands of daily measurement data verification.

The current industry trend is to rely on a rules based software package to validate all of the raw electronic measured data that is received from the RTU's in the field. Only the meters that do not pass the validation logic checks are individually reviewed for accuracy as represented in Figure 1.

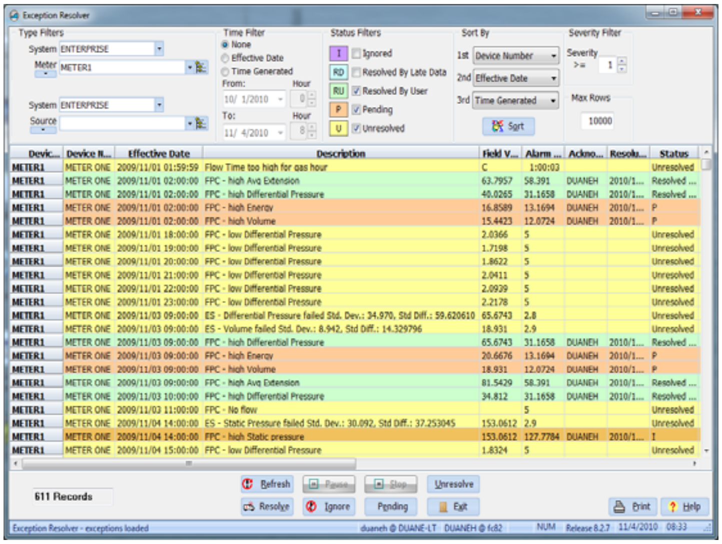

Figure 1. Meter Exception Report

<u>Importance of Scheduling Inspections and Calibrations</u>

The scheduling of meter test inspections and calibrations, gas sampling, and routine maintenance is crucial. Most company's tariff's, SOPs and/or contracts specify the frequency for the required tasks. Some facilities scheduling requirements are also driven by governmental agencies such as the Bureau of Land Management (BLM) and the Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEMRE). There are a number of gas companies with significant exposure in the industry due to their inability to comply with their scheduled meter test inspections dictated by their contract, tariff, or SOP. When a company deals with a significant number of monthly inspections, the task to schedule these inspections and calibrations become labor intensive. It is usually during an audit that organizations determine whether they are in compliance with their scheduled commitments.

Many natural gas companies have taken advantage of computer based tools to document the required tasks along with the schedule for performing these tasks. These industry utilized tools can provide the required information in a format that makes it quick and easy to identify delinquent tests and therefore minimize a company's potential exposure. One of the strengths of these computer based tools is the ability to sort and prioritize the work by area, region, and throughput. This leads to better utilization of a technician's time. Figure 2 below illustrates how easily a delinquent test is identified and depicted. This calendar view (whereby delinquent tests are highlighted in red) is just one of many ways that the schedules can be viewed, reported, and exported.

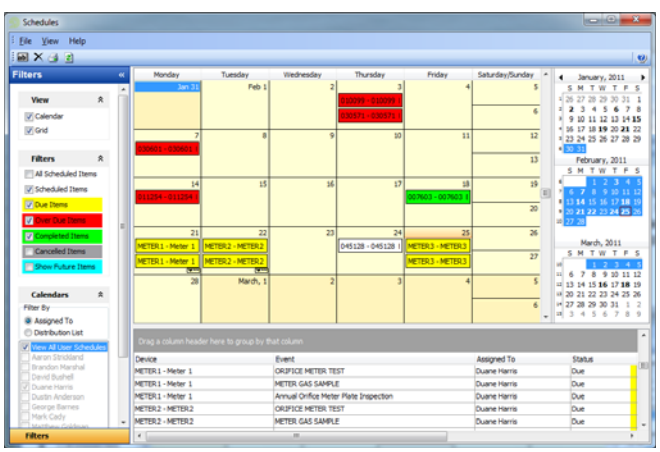

Figure 2. Calendar View

Scheduled Testing and Calibration tasks can provide the office staff with the benefit of knowing what region of the system a technician may be located on any given day. This provides additional insight for troubleshooting exceptions and anomalies identified on a meter.

Understanding the Testing and Calibration Form

The importance of standardizing an inspection/calibration form, whether it is paper or electronic, is essential in developing a consistent interpretation and effective communication across all regions of a corporation. It is difficult for the measurement analyst or technician to interpret five different regional forms to determine if the information is complete, conflicting, or wrong. When a company incorporates standardization of both their form and procedures, it helps to eliminate some of the often confused aspects of a test (as listed below).

- Is the working pressure zero adjusted prior to adjusting the atmospheric pressure zero?
- Is the working pressure zero adjusted prior to determining the "as found "multi point calibration?
- When making adjustments to the multi point calibration, are the adjustments made at each point or at the conclusion of the multi point calibration?
- Is your calibration equipment PSIG or PSIA as compared to the transmitter?
- Should any adjustments be made to the transmitter based on the multi point calibration or should the transmitter be replaced and recalibrated at the factory or certified facility?
- The ability to attach pictures of key witnessed events is critical to the documentation process. As they say a picture is worth a thousand words as pointed out in Figure 3.

Figure 3. Picture to attach to documentation

Processing the Test and Calibration Form – The Challenge: "Checking vs. Auditing"

One key step in the calibration and testing process usually receives the least amount of focus and therefore provides vague end results due to the difficulty of the task. Time invested in this effort will have a direct bottom line impact on measurement. This process will provide the ability to determine a number of items including, but not limited to:

- when an adjustment should be made
- what equipment is out of tolerance
- where suspect plate sizes and tube-ids are in use on the system
- which measurement technicians may require additional training

For years, the process of reviewing the calibration and testing forms has been a manual process or "checking". A significant amount of time has been invested in validating plate sizes, Tube Ids, K-factor, Meter Multipliers, various transmitter/chart ranges, various transmitter/chart calibrated ranges, RTU gas quality, as well as the endless list of user defined fields that every company requires and views as critical. The ability to identify any substantial variances in a manual environment depends upon the education and training of a measurement analyst. Most companies provide a plus/minus tolerance for static pressure, temperature, and differential pressure based on certain ranges. An analyst must perform an additional assessment to determine if the adjustment made a 2% volume difference.

Today all of these processes of identifying variances can be automated and flagged to direct the analyst to problem areas automatically. This should eliminate the need to review every calibration and test report. The validation process can now be configured to create exceptions, when necessary, for all calibration and test reports received. An analyst can easily review automatically flagged data including:

- Plate Sizes and Tube IDs are different
- K-factors, meter multipliers various transmitter/chart ranges, various transmitter/chart calibrated ranges are different,
- Unique company required fields

All meter adjustments can be processed automatically or "audited" to determine if an adjustment is required based on the calibration and testing results for each reference point. Any auditor in the industry will strongly urge all companies to review each calibration and test report either through a manual or automated exception based process. They can then be certain all reported discrepancies are identified and resolved.

Conclusion

In the ever changing gas industry, there must be a working form of communication between the field and office. With the impact of FERC Order 636, NAESB, API 21.1, unaccounted for gas loss, and proposed hourly processing, gas companies must verify and process data with more accuracy and more rapidly than ever before. The environment is in constant flux and shows no signs of flowing down. It is imperative for every company to maintain industry standards and gas measurement practices. By participating in measurement schools, companies will be able to stay current with the latest industry trends and policies.

Effective communication is a requirement in order to stay competitive in the industry. An Effective Communication link between the office and field is essential in order to meet the challenge placed upon the Gas Measurement area. Developing and supporting the proper communication channels between the office and field can be time consuming and expensive. However, the resulting accuracy and integrity of the gas measurement system is well worth the investment.