

White Paper

Natural Gas Measurement Technician Training and Development Guidelines

Prepared by

AGA Transmission Measurement Committee

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Scope

This document is intended to define a comprehensive list of tasks including the minimum knowledge, skill and time requirements to develop necessary competence for measurement field personnel.

Individual companies utilize personnel for a variety of measurement responsibilities and may have to customize the use of this list in their training and skill development programs to adequately develop personnel within their organizations.

Background

Currently, natural gas distribution and transmission companies are facing new challenges maintaining adequate training regimes that produce measurement technicians with the skills and competencies required to perform measurement tasks safely and effectively. Workforce dynamics and advances in measurement technology challenge companies to provide adequate training opportunities necessary to produce competent technicians. Technical personnel continue to exit the measurement discipline at an increasing rate through retirement or other opportunities.

Development programs, which include aptitude recognition, knowledge, and skill progression, should be structured to improve the retention of existing and newly hired technicians. These programs need to provide for expeditious and comprehensive qualification of technicians.

Choosing the Right Candidate

Selecting a candidate that has the pre-requisite skills and aptitude for fulfilling the requirements of a measurement technician can be difficult if the responsibilities of the position are not fully considered.

Some of the pre-requisite skill areas and aptitudes that should be considered are:

- Ability to Work Independently
- Analytical and Troubleshooting
- Chemistry
- Computer
- Electrical/Electronics
- Interpersonal Communication
- Mathematics
- Mechanical
- Physical Capabilities
- Reading and Comprehension of Technical Documentation

Candidates must be made aware of and understand the importance of the measurement technician's role in operating and maintaining the equipment related to safe, reliable, and accurate gas measurement.

Technician Development

It is desired that a new technician be exposed to a variety of experiences that fulfill development objectives at a satisfactory pace and meet the requirements of the position. A balanced program that incorporates computer based, classroom, formalized hands-on, and on-the-job training may be utilized. Gas property and measurement technology training is better suited for computer based modules and classroom instruction. However, skill development through exposure to actual field experiences cannot be simulated in classroom or computer based training. For example, reacting to pressure control requirements of a specific pipeline system cannot be taught, except at a field location. Confidence and proficiency should be gained through both classroom and real life experiences.

Development Program

A properly designed training program should include:

Program Considerations

- Complements Company Safety Initiatives
- Simple Relationships to the Work Environment
- Clearly Defined Objectives
- Sustainability and Continuity of Material
- Formal Structure with Pre-Requisites
- Instructor Qualifications
- Management of Change for Training Materials

Instruction

- Computer Based Training (CBT)
- Lecture/Formal Interaction
- Laboratory/Hands-On
- Field Experience (OJT)
- Equipment Specific Training
- Mentoring Programs

Comprehension

- Pre-Testing/Evaluation
- Post-Testing/Evaluation
- Skill Demonstration

The table in the following pages may be used as a training guide that would be a precursor to the demonstration of competence. Competency is defined here as the ability to safely and proficiently execute tasks without supervision. The table lists a series of tasks that are considered to be relevant to the operation of measurement facilities. The tasks are categorized as either Base knowledge (B) or Advanced knowledge (A). A recommended minimum and an expected maximum number of training and skill development hours required to reach competency are listed for each task. Skill development hours represent time spent on the job to develop proficiency. Each company should evaluate the listed tasks to determine the appropriate number of hours required to reach competency (training and/or skill development) for their specific measurement job description. Again, the ranges provided below are estimates; it is left to each company's discretion in establishing an effective training and competency program.

MEASUREMENT TASKS Basic Level

	Level B = Base A = Advanced	Recommended Minimum Training Hours	Estimated Maximum Training Hours	Recommended Minimum Skill Development Hours	Estimated Maximum Skill Development Hours
FUNDAMENTALS & STANDARDS OF GAS MEASUREMENT	B	28	36	0	0
FUNDAMENTALS OF CODE & SAFETY COMPLIANCE	B	24	32	0	0
AUDIT METER STATION FACILITIES	B	24	32	40	80
CALCULATE & REPORT UNMETERED GAS USAGE	B	8	16	8	16
CHANGE METER STATION STATUS (active, inactive, unavailable, abandoned)	B	2	4	2	4
CHANGE, INSPECT & SIZE ORIFICE PLATES	B	8	16	8	16
CLEAN & INSPECT METER TUBES	B	8	12	8	16
COLLECT GAS SAMPLES	B	4	8	8	16
CONDUCT LENGTH OF STAIN TUBE TEST (All Required Quality Tests)	B	2	4	8	12
CONFIGURE METER STATION ALARM SETTINGS AND/OR SHUT-IN VALVES	B	8	16	16	24
COORDINATE METER STATION ABANDONMENT	B	4	8	4	8
DIVERT & BYPASS METER STATION GAS FLOW	B	8	12	8	12
ELECTRONIC FLOW MEASUREMENT (EFM) DATA COLLECTION	B	2	4	4	8
GAS QUALITY SHUT-IN AND MONITORING	B	16	24	12	16
INSPECT, TROUBLESHOOT & REPAIR PRESSURE REGULATOR (Worker Device)	B	24	40	36	64
INSTALL & CONFIGURE EFM HARDWARE & SOFTWARE	B	4	8	8	12
INSTALL & MAINTAIN DC POWER SYSTEMS	B	4	8	8	16
INSTALL & TEST CHROMATOGRAPHS	B	8	16	16	32
MAINTAIN & REPAIR CORIOLIS METERS	B	8	16	8	16
MAINTAIN & REPAIR ORIFICE FITTINGS	B	12	24	20	40
MAINTAIN & REPAIR CHROMATOGRAPHS	B	16	32	16	32
MAINTAIN & REPAIR ULTRASONIC METERS	B	16	32	8	16
MAINTAIN & REPAIR POSITIVE DISPLACEMENT METERS	B	16	24	16	24
MAINTAIN & REPAIR TURBINE METERS	B	16	40	4	8
MAINTAIN & TRANSPORT COMPRESSED GAS CYLINDERS FOR ON-LINE ANALYZERS	B	2	4	2	4
MANAGE EFM ALARMS AND LIMITS	B	8	16	16	24
MANAGE GAS PROPERTY AND L&U ZONES	B	8	12	8	12
OPERATE & MAINTAIN ELECTRONIC CORRECTORS	B	8	12	16	24
OPERATE & MAINTAIN GAS SAMPLERS	B	4	12	4	12
OPERATE & MAINTAIN GAS SEPARATOR	B	8	16	8	16
OPERATE & MAINTAIN PORTABLE GRAVITOMETER	B	4	8	12	16
OPERATE & MAINTAIN STATION/CATALYTIC INSTRUMENT HEATERS	B	2	4	2	4
OPERATE, INSPECT & MAINTAIN BYPASS/WICK ODORANT SYSTEM	B	4	8	8	16
OPERATE, INSPECT & MAINTAIN INJECTION ODORANT SYSTEM	B	8	16	8	16
OPERATE & MAINTAIN INSERTION/CLAMP-ON METERING DEVICES	B	4	6	4	8
OPERATE, TEST & MAINTAIN (O ₂) ANALYZERS	B	8	16	16	32
OPERATE, TEST & MAINTAIN CARBON DIOXIDE (CO ₂) ANALYZERS	B	8	16	16	32
OPERATE, TEST & MAINTAIN MOISTURE ANALYZERS	B	8	16	16	32
OPERATE, TEST & MAINTAIN SULFUR ANALYZERS	B	8	16	16	32

MEASUREMENT TASKS
Basic Level
(Continuation from previous page)

	Level B = Base A = Advanced	Recommended Minimum Training Hours	Estimated Maximum Training Hours	Recommended Minimum Skill Development Hours	Estimated Maximum Skill Development Hours
OPERATE, TEST & MAINTAIN VALVE ACTUATOR	B	8	16	8	16
PERFORM ODOROMETER TESTS	B	2	4	8	12
REVIEW & EDIT VOLUME DATA	B	8	12	8	12
REVIEW METER STATION DESIGN & CONSTRUCTION DRAWINGS	B	8	12	8	12
TEST & MAINTAIN TRANSMITTERS	B	8	16	8	16
TEST CONTROL VALVE	B	8	16	16	24
TEST METER OR WITNESS METER TEST	B	8	12	8	16
TEST PRESSURE REGULATOR (Worker Device)	B	8	16	16	24
TEST RELIEF DEVICES	B	8	16	16	24
TEST & MAINTAIN CHART RECORDERS	B	8	12	16	32
TRANSFER PROVE FIELD METERS	B	8	12	8	12
TUNE & ADJUST CONTROLLERS & POSITIONERS	B	12	24	12	16
Basic Level Total Hours:		456	810	550	984

MEASUREMENT TASKS
Advanced Level

	Level B = Base A = Advanced	Recommended Minimum Training Hours	Estimated Maximum Training Hours	Recommended Minimum Skill Development Hours	Estimated Maximum Skill Development Hours
BASIC TROUBLESHOOT & REPAIR REMOTE SCADA COMMUNICATIONS EQUIPMENT	A	16	32	32	64
CRITICAL FLOW PROVE FIELD METERS	A	4	6	8	24
INSPECT, TROUBLESHOOT & REPAIR CONTROL VALVES	A	12	24	16	24
INSPECT, TROUBLESHOOT & REPAIR RELIEF VALVE	A	8	16	16	24
RECOGNITION & DIAGNOSIS OF PULSATION AT METER STATIONS	A	8	16	16	40
TROUBLESHOOT & REPAIR CARBON DIOXIDE (CO ₂) ANALYZERS	A	16	32	16	32
TROUBLESHOOT & REPAIR CONTROLLERS & POSITIONERS	A	16	24	36	64
TROUBLESHOOT & REPAIR EFM HARDWARE & SOFTWARE	A	16	24	16	24
TROUBLESHOOT & REPAIR GAS SAMPLERS	A	8	16	8	16
TROUBLESHOOT & REPAIR MOISTURE ANALYZERS	A	16	32	16	32
TROUBLESHOOT & REPAIR OXYGEN (O ₂) ANALYZERS	A	16	32	16	32
TROUBLESHOOT & REPAIR SULFUR ANALYZERS	A	16	32	16	32
TROUBLESHOOT & REPAIR TURBINE METERS	A	8	12	8	24
TROUBLESHOOT & REPAIR ULTRASONIC METERS	A	12	24	24	40
TROUBLESHOOT AND REPAIR CHROMATOGRAPHS	A	16	32	40	80
TROUBLESHOOT, INSTALL AND REPAIR CORIOLIS METERS	A	8	16	8	16
TROUBLESHOOT & REPAIR POSITIVE DISPLACEMENT METERS	A	16	24	16	24
Advanced Level Total Hours:		212	394	308	592
Grand Total Hours (Basic + Advanced):		668	1204	858	1576