

# 4 DAY COMPREHENSIVE SAMPLING SYSTEMS

## THE INSTRUCTOR

Tony Waters has 40 years' experience with process gas chromatographs and other analyzers. He has founded three companies to provide specialized analyzer services to the process industries and is an expert in the application of process analyzers in refineries and chemical plants.

Tony developed these training courses from his long experience in the field. His presentations are always popular, and have equal appeal with engineers and maintenance technicians. The seminar has been presented in Australia and in many of the countries of Asia, Europe, Middle East, North America and South America.

## The Program

As process analyzers become more vital for the control of process optimization, the effective training of engineers and technicians is mandatory. Process analyzers will not achieve the availability needed for advanced control unless instrument engineers are trained in the design requirements for reliable analyzer systems and maintenance technicians are trained to service them.

During the two day class we will cover in detail: Criteria for Successful Sampling, Sample Tap Location, Time Delay Issues, Troubleshooting the Sampling Train, Sample Conditioning and Switching. Instruction is by lecture and by individual and team exercises. Students will learn from what they hear, but more from what they do and by working with others.

\$2,995.00 per person

Breakfast and Lunch provided each day

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## TASC – Technical Automation Services Corporation

We specialize in Analyzer Systems Integration, Technical Services and Support, Training and Environmental Consulting and Testing. Since 1990, we have been providing quality products, personnel and services to our Customers.

For More Information or to register please  
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# 4 DAY COMPREHENSIVE SAMPLING SYSTEMS

## Comprehensive Sampling Systems

This very popular class provides a detailed Understanding of process sampling for engineers, analyzer technicians, and plant chemists. Ultimately, all troubleshooting comes down to correcting errors in design. Students see how to diagnose and avoid errors, thus maintaining a single phase and avoiding contamination during conditioning or stream switching.

This is an advanced class for analyzer engineers and technicians who need to improve the performance and reliability of their process analyzer sampling systems. Actual design exercises are used to practice design principles which can be used in the plant to improve speed of response and system reliability. Since most sampling difficulties are due to inadequate design, knowledge of these principles will allow graduates to quickly diagnose on-site design errors and properly correct them. Some exercises use custom software.

### DESIGN OBJECTIVES

- Three Essential Requirements
- Why is it difficult to achieve them
- Some Common issues to Avoid

### SAMPLE EXTRACTION AND TRANSPORT

- Evaluate the Process Tap Location!
- Probe Types and Uses
- Sample Transport Systems
- How to Calculate  $d/v$  Lag in Lines
- How to Estimate Delay in Vessels

### PHASE PRESERVATION

- How to Avoid or Cause Condensation
- Vaporization is Difficult! How to Avoid Time Delay or Fractionation
- The Need for Proper Sequence

### SAMPLING HARDWARE

- Various Filters and Coalescers
- Vaporizers and Separators
- Permeation Devices

### MULTI-STEAM SWITCHING

- How to Eliminate Dead Legs
- How to Avoid Cross-Contamination
- Student Troubleshooting Exercise
- Six "Rules" for Success

## WHO SHOULD ATTEND?

Process Analyzer Maintenance Technicians

Plant Analyzer Engineers and Chemists

Instrumentation Engineers

Analyzer System Design Personnel

Analyzer Sales Engineers

# 4 DAY COMPREHENSIVE SAMPLING SYSTEMS

## Comprehensive Sampling Systems

- What we need to know; design parameters
- How to specify a process nozzle
- Sample tap and probe design issues
- When a field station is essential...or desirable
- How to sample high-pressure gas lines
- How to vaporize a liquid sample at the process tap location
  
- Design issues for fast loops and sample return lines
- Figuring the required flow rate (it's not just time delay!)
- How to calculate the fluid velocity in each line segment
- Laminar or turbulent flow?
- The effect of line temperature and pressure
- How to calculate the pressure drop in each line segment
- The effect of line elbows and elevation change
- Exercises with a pressure – drop calculation spreadsheet
  - Student laptop required
  
- When do gases condense and by how much?
- How to prevent (or cause) condensation
- How to read phase diagrams
- Bubble point and dew point; triple point and critical point
- How to vaporize a sample for analysis
- How to deal with aerosols, emulsions and foams
  
- Introduction to SP76 modular sampling components
- Review of NeSSI specifications, expectations and current status
- Using status indicators and controls
- How to configure modular sample systems
- Exercises with a commercial configuration program
  - Student laptop required