AVANTech's Unique Vapor Detection System for DOE High-Level Waste (HLW) Tanks

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Introduction

Purpose

Develop a Continuous Emissions Monitor (CEM) Smart Sampler that could be field implemented to monitor, detect, and remediate potentially harmful Hanford tank waste related vapors.

System Objectives

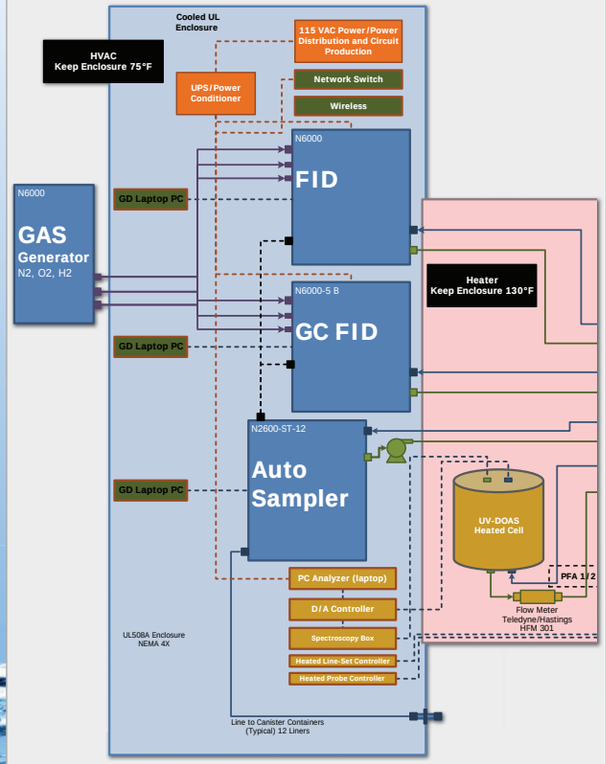
- ✓ Determine and establish basis for leading indicators
- ✓ Confirm and validate assumptions currently used
- ✓ Characterize and quantify vapor constituents
- ✓ Obtain reproduceable and verifiable results
- ✓ Provide real-time detection of key Chemicals of Potential Concern (COPCs)
- ✓ Provide reliable identification of constituents in near real-time

Continuous Emissions Monitor (CEM) Smart Sampler System

Usage

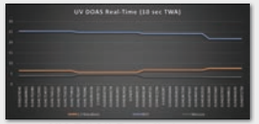
- ✓ Exhaust Stacks
- ✓ Tank Head Space
- ✓ Area Monitoring
- ✓ Real-Time Sample Verification
- ✓ Emergency Detection

CEM Smart Sampler System Schematic



Key Features

- ✓ Combines proven real-time, near real-time, and sampling technologies to obtain high fidelity real-time monitoring and laboratory verification as needed.
- ✓ **Quality Test Data:**
  - Set standard practices that allow test results to be repeated by others.
  - Set data reporting standards to allow the validity of test data to be determined.
  - Set accuracy and precision thresholds that provide a common quality standard to assess performance.

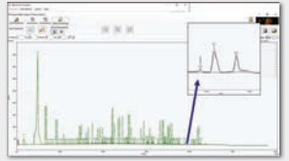


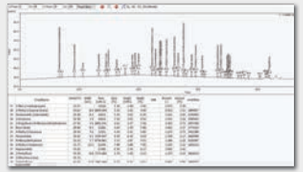
UV-DOAS Data Output – Ammonia, Mercury, 1,3-Butadiene

FID Data Output – Real-Time TVOC

Highly Repeatable
(multiple runs yield overlapping results)
Calibration Gas – Multiple Runs

Test/Challenge Gas – Multiple Runs





GC-FID Calibration Gas Runs – Near Real-Time

Results

- ✓ Real-time detection of compounds in a gas with an emphasis on Ammonia, Mercury, and 1,3-Butadiene.
- ✓ The Gas Chromatography Flame Ionization Detector (GC-FID) provides near real-time quantification and characterization of 59 COPCs to two parts per billion.
- ✓ The Flame Ionization Detector (FID) provides real-time monitoring and detection of the Total Volatile Organic Compounds (TVOC) in a gas stream.

System Benefits

- ✓ Real-time detection
- ✓ Real-time total VOC determination
- ✓ Near real-time identification and quantification of the 59 COPCs down to 2 ppb
- ✓ Minimal calibration and maintenance
- ✓ Can be utilized as a head space monitor, area monitor, and stack sampler
- ✓ Can leave suma and sorbent samplers in the container for the shelf-life duration
- ✓ Compliant with applicable US EPA air sampling and analysis methods
- ✓ Efficient storage and testing of air samples

Continuous Emissions Monitor (CEM) Smart Sampler System