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ENVIRONMENTAL APPLICATIONS FOR PIDS

A PID is a continuous, broad-band monitor that detects most volatile organic compounds (VOCs) with a carbon range from 1 (e.g., methylene chloride – CH_2Cl_2) to over 15 (e.g., diesel fuel). A MiniRAE 2000 measures from 0.1 to 10,000 ppm and a ppbRAE Plus measures from <10 ppb up to 2000 ppm. RAEGuard fixed PIDs have ranges down to 10 ppb and up to 1000 ppm. Environmental contractors and consultants use PIDs to monitor the remediation of industrial waste sites and closed military bases.

MINIRAE 2000: EPA METHOD 21 COMPLIANT

EPA Method 21 is a standard for monitoring leaks, calibrating field monitoring equipment and principles for monitoring fugitive emissions. Tougher requirements have resulted in the need for better detection equipment for monitoring VOC leaks. For more information on Method 21, refer to TN-122: Compliance of RAE Systems PIDs with EPA Method 21.

The leak definition limits have in some cases been pushed from 10,000 ppm down to 500 ppm. The specifications for the MiniRAE 2000 photoionization detector in the table on the right show its compliance with the specifications in EPA Method 21 (40 CFR Pt. 60, App. A), entitled *Determination of Volatile Organic Compound Leaks*.

Method 21 Specification	MiniRAE 2000
3.1.1a Detects compound	Responds to a broad range of organic compounds
3.1.1b Encompasses leak definition	0 to 10,000 ppmv
3.1.1c Instrument Scale (Resolution) = ±2.5% of leak definition	0.1 ppmv (0 to 999.9 ppmv) 1 ppmv (1000 to 10,000 ppmv)
3.1.1d Pump Flow Rate = 0.1 - 3.0 L/min	0.4 to 0.6 L/min
3.1.1e Intrinsic Safety = Class 1 & 2, Division 1	Cl.1 Div.1Approved Cl.2 Div.1 Pending
3.1.1f Probe Dimension = ≤1/4 inch O.D.	3/16" O.D.
3.1.2a Response Factor Value = <10	< 10 for most compounds, using isobutylene cal. gas
3.1.2b Response Time = ≤30 seconds to 90%	≤2 seconds to 90%
3.1.2c Calibration Precision = ±10% of Cal. gas value	±2% of calibration gas value
3.1.3a Response Factors Availabile	Available for >100 compounds
3.1.3b Cal. Precision Test = Initial and every 3 months	Simple daily calibration
3.1.3c Response Time Test = Initial	Manufacturing flow test ensures short response time
3.2 Cal. Gas Certification = ±2%	±2%

SOIL REMEDIATION

Leaking Underground Storage Tanks

The MiniRAE 2000 portable PID is ideal for BTEX (benzene, toluene, ethyl benzene, xylene) and TPH (total petroleum hydrocarbon) in gasoline, diesel and jet fuel. This makes the MiniRAE 2000 an excellent instrument for headspace analysis to determine soil contamination from leaking underground storage tanks. Both environmental engineers and the petroleum industry can use this unit to monitor gas stations, industrial sites, commercial transportation refueling sites and all defense bases.

Environmental Soil Contamination Monitoring

Environmental engineers and consultants can use the MiniRAE 2000 for environmental soil contamination monitoring at industrial real estate sites and closed military bases. The MiniRAE 2000 enables them to determine, before the sale of land, whether the soil is contaminated by VOCs. Due diligence and environmental impact studies, prior to purchase, allow for safe rezoning to homes, shops and parks.

Environmental Remediation Process Control

RAEGuard fixed PIDs have been installed at numerous remediation sites to determine effluent levels and/or treatment efficiency. Such sites include soil vapor extractions using activated carbon adsorption, soil incineration sites, and bioremediation treatments. The RAEGuard PIDs offer 4-20 mA outputs to allow for continuous data recording and two dry contacts for process controls should concentrations exceed pre-set alarm limits. Because the MiniRAE 2000 can be run continuously off the charger and has 15,000 datalogging points and continuous voltage output, it can also be used to monitor treatment effluent levels.

HEADSPACE SCREENING

Determining the Level of Toxic VOCs in Drinking Water

Hydrologists and environmental engineers can utilize the MiniRAE 2000's ability to monitor chlorinated solvents (carbon tetrachloride) and VOCs (toluene) in groundwater at drill and well sites or closed industrial plants, military bases or nuclear facilities.

Soil and Water Headspace Screening

Determine the soil or water contamination by headspace analysis. A sample of soil or water is collected in a ring-type jar; the soil or water should fill the jar approximately halfway. A piece of aluminum foil is placed over the mouth of the jar and held in place with the lid ring. The jar and its contents are brought to room temperature. The MiniRAE 2000 portable PID can then be used by poking the probe through the foil and reading the VOC concentration found in the headspace of the jar. See Technical Note 118 for more details.

HAZARDOUS WASTE MONITORING

Toxic Hazardous Waste Monitoring

Hazardous waste contractors and engineers and industrial hygienists, concerned with occupational health, determine levels of toxic vapors or volatile organic compounds. The MiniRAE 2000 allows them to pinpoint the most hazardous areas at old disposal sites, disused industrial plants, closed military bases and during hazardous waste transportion. The MiniRAE 2000 can help determine the correct level of personal protective equipment (PPE) – typically requiring Self-Contained Breathing Apparatus (SCBA) – to use.

Drum Monitoring

Hazardous waste contractors and environmental engineers can easily determine drum and other container contents at old disposal, landfill and garbage sites as well as closed industrial plants and military bases.

REFERENCES

Carol J. Maslansky, Steven P. Maslansky: *Photoionization Detectors in Air Monitoring Instrumentation*, Van Nostrand Reinhold, New York, 1993

NIOSH: *Pocket Guide to Chemical Hazards*, NIOSH Publications, Cincinnati, OH 1994

RAE Systems: Technical Note TN-106: Correction Factors and Ionization Potentials

RAE Systems: PID Training Outline

RAE Systems: Christopher Wrenn