



LEVEGO
Environmental Services

TRANSPORTABLE SEMI-CONTINUOUS EMISSIONS MONITORING SYSTEM/MOBILE EMISSIONS LAB – PART 1



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TABLE OF CONTENTS

1. INTRODUCTION	2
2. INFORMATION	3
2.1 EQUIPMENT INCLUDED	3
2.1.1 <i>Trailer</i>	3
2.1.2 <i>Gas Dilution and Calibration Equipment</i>	4
2.1.3 <i>Sample Conditioning Equipment</i>	4
2.1.4 <i>Analysers</i>	5
3. PROJECT TEAM COMPETENCE AND EXPERIENCE	8

1. INTRODUCTION

Levego Environmental Services (Pty) Ltd, hereafter referred to as LES, designed, developed, and built, in collaboration with Ansyco CC, a TRANSPORTABLE SEMI-CONTINUOUS EMISSIONS MONITORING SYSTEM/MOBILE EMISSIONS LAB.

A mobile emissions lab capable of continuous real time measurements of a wide variety of pollutants as required by legislation for compliance monitoring, greenhouse gas emissions, engineering studies, calorific value determination and many more applications.

The mobile emissions system provides a powerful tool to get to the source of the emissions and reveal the unique chemical signature of each of the stages and components of emissions sources. In addition to a suite of gas analysers, the system includes a meteorological system (temperature, humidity, and wind speed and direction) and isokinetic sampling equipment. Aspects of the systems hardware, sampling methods and operations are discussed along with a few highlights of the measurements.

The following advantages are highlighted,

1. Real time measurements of target pollutants
2. Identification of non-target pollutants that may be of interest
3. Built in quality control and quality assurance using
 - a. Certified gas cylinders
 - b. Calibrated mass flow dilution devices
4. Autonomous sampling, 24 hours a day, increasing the number of stacks that can be measured in a day
5. Fitted with certified analyzers
6. Certified sample conditioning prior to analyses
7. Sample dilution for high ranges
8. Certified gas cylinders
9. Data logging and data management with remote access

2. INFORMATION

2.1 EQUIPMENT INCLUDED

2.1.1 TRAILER

- Trailer Unit 2.5m x 2.2m
- Double Axel Suspension with additions
- Remote data access, trend download, live data via GSM
- House isokinetic equipment
- Temperature regulated



Figure 1: Trailer with probe holders.



Figure 2: Trailer with aircon cage and gas cylinder cage



Figure 3: Trailer with sample line reel and data cable

2.1.2 GAS DILUTION AND CALIBRATION EQUIPMENT

- Mass flow gas divider to enhance quality assurance of mobile emissions trailer, including certified reference material



Figure 4: Dilution Calibrator



Figure 5: Calibration Standards

2.1.3 SAMPLE CONDITIONING EQUIPMENT

- FTIR components; heated probe, heated filter system and heated sample line
- M&C System for the conditioning and supply of dry dust free sample gas to be analysed by Horiba PG350 and H₂S System, heated sample probe, heated sample line and chiller



The portable gas sample probe PSP4000-H is electrically heated. Temperature controlling is achieved by an integrated capillary sensor- thermostat, adjustable from 100 to 180 °C. A signal lamp is extinguished on reaching the operating temperature and flashes in the cycle of temperature regulation.



The M&C portable gas conditioning unit PSS-5... is designed to carry out precise gas analyses at different locations. Portable gas conditioning system type PSS5C/3 for max. 350 NI/h cooling capacity, in a plastic protective case IP42 consisting of: 0.5 m SS sample tube 6 mm, 3 m PVC hose DN 4/6, gas cooler ECP3000-C-G, universal filter FP-2T, with sample gas pump N3KPE, peristaltic pump SR25.2. W, power: 230 V/50 Hz, tubing in PTFE/PV, the sample gas pump starts when the sample gas cooler falls below +8 °C.



Electrically heated sample line type PSP4M4/6 with replaceable PTFE tube DN 4/6, stainless steel tube stub adapted to the probe, max. temperature: 200 °C, 230 V/50 Hz, price per meter.

2.1.4 ANALYSERS

- Horiba PG350 Z



Ranges:
 NO_x: 0-25/50/100/250/500/1000/2500 ppm (A-range; standard spec.)
 0-50/100/250/500/1000/2500/5000 ppm (B-range)
 SO₂: 0-200/500/1000 ppm
 CO: A-range 0-200/500/1000/2000/5000 ppm (standard spec.)
 CO₂: 0-5/10/20 vol%
 O₂: 0-5/10/25 vol% (Zirconia method)

- Analytical Systems Keco's Model K32 Hydrogen Sulphide Analyser



Provide on-line analytical measurement of hydrogen sulphide (H₂S) concentrations. Depending on the selected accessories, the measurement concentration range varies from parts per billion up to percent levels. The TAPE technology provides specific, interference free, detection and measurement. H₂S detection and concentration analysis by the use of TAPE are based on chemical factors and physical constants, which confirm the unique analytical precision of the technology.

- The atmosFIR (Portable Fourier Transform Infrared)

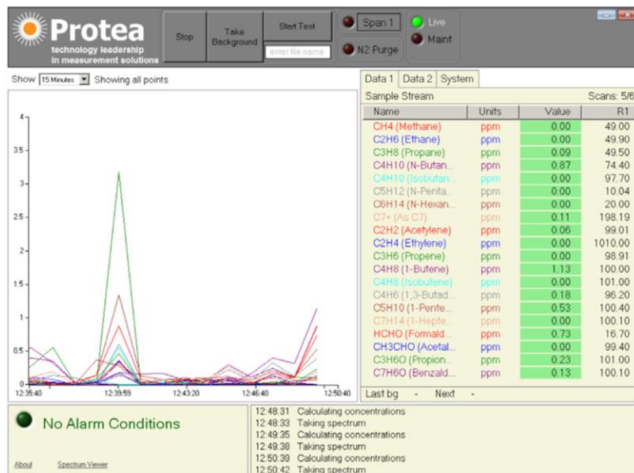


Figure 6: ProPAS – atmosFIR data acquisition system



Figure 7: atmosFIR heated sample system



The atmosFIR unit with mass flow controller included for dilution of high concentration level gases to within the analyser measurement range.

- Standard Units and ranges:

Component	Ranges / mg/m ³	Lower detection Limit (LDL) / mg/m ³	Component	Ranges / mg/m ³	Lower detection Limit (LDL) / mg/m ³
CO	0-75 0-1000	0.6	CH ₄ (Methane)	0-50 0-1000	0.1
NO	0-200 0-600	1.0	C ₂ H ₆ (Ethane)	0-50 0-1000	0.1
NO ₂	0-200 0-600	0.6	C ₃ H ₈ (Propane)	0-50 0-1000	0.8
N ₂ O	0-50 0-400	0.4	C ₂ H ₄ (Ethene)	0-50 0-1000	0.4
SO ₂	0-75 0-1000	0.6	HCHO (Formaldehyde)	0-20 0-100	0.2



NH ₃	0-15 0-50	0.1	TOC (Indication only)	0-50 0-1000	-
HCl	0-15 0-100	0.2	H ₂ O	0-40%	0.02%
HF	0-15 0-50	0.2	CO ₂	0-20%	0.005%

- Total volatile organic compounds (TVOC) Speciated list:

Component Name	Formula	Range (ppm)	LDL (ppm)
Alkanes			
Methane	CH ₄	0-1000	0.07
Ethane	C ₂ H ₆	0-1000	0.16
Propane	C ₃ H ₈	0-1000	0.53
N-Butane	C ₄ H ₁₀	0-1000	0.69
Isobutane	C ₄ H ₁₀	0-100	0.18
N-Pentane	C ₅ H ₁₂	0-100	0.11
N-Hexane	C ₆ H ₁₄	0-100	0.12
C7 + Alkanes as C7	C ⁷⁺	0-100	0.74
Alkenes			
Ethylene	C ₂ H ₄	0-1000	0.20
Propene	C ₃ H ₆	0-100	0.54
1-Butene	C ₄ H ₈	0-100	0.84
Isobutene	C ₄ H ₈	0-100	0.52
1,3 Butadiene	C ₄ H ₆	0-100	0.09
1-Pentene	C ₅ H ₁₀	0-100	0.91
1-Heptene	C ₇ H ₁₄	0-100	0.90
Alkynes			
Acetylene	C ₂ H ₂	0-100	0.12
Aldehydes			
Formaldehyde	HCHO	0-20	0.29
Acetaldehyde	CH ₃ CHO	0-100	0.18
Propionaldehyde	C ₃ H ₆ O	0-100	0.12
Benzaldehyde	C ₇ H ₆ O	0-100	0.03
Acrolein	C ₃ H ₄ O	0-100	0.06
Aromatics			
Benzene	C ₆ H ₆	0-100	0.42
Toluene	C ₇ H ₈	0-100	0.02
Ethyl benzene	C ₈ H ₁₀	0-100	0.54
O-Xylene	C ₈ H ₁₀	0-100	0.23
Naphthalene	C ₁₀ H ₈	0-100	0.04
TOTAL AROMATIC	-	0-100	0.80
TOTAL ORGANIC CARBON	-	0-1000	1.34

- Weather station, humidity, wind speed and direction



Rain, wind, temperature, and humidity sensors in a rugged sensor suite with optional UV and solar

- Data logging and data management with remote data access to allow the user to monitor emissions at any time. Real time can show changes in emissions due to operational changes, shift changes, upset conditions, irregular activity after hours, etc.

3. PROJECT TEAM COMPETENCE AND EXPERIENCE

Levego cc initially started operations on 03 September 2001. The main objective was to supply reliable, cost effective and accurate stack emissions results to the South African and African industrial sector. Levego cc transformed to Levego Environmental Services (Pty) Ltd in 2017, a Level 2 black-owned company. Its founding members were D L Posthumus and G B Woollatt, while H L Butcher joined the team in 2002. They all remain active in Levego Environmental Services (Pty) Ltd.'s operations and management. Curtis Malinda, Projects Director, joined the Levego Environmental Services executive team in 2018 and has been with the company for 12 years.

Based in Modderfontein, Gauteng, Levego Environmental Services (Pty) Ltd now offers its nationwide and international client base a professional, competitively priced and specialised suite of environmental services and laboratory analyses.

Levego Environmental Services (Pty) Ltd.'s directors have more than fifty years combined experience in the field of air pollution monitoring and industrial pollution control.

All personnel performing isokinetic stack sampling are trained under our continuous quality improvement programme. Rigorous evaluation ensures all staff are competent where required in line with our ISO/IEC 17025:2005 (T0846) and ISO 9001:2015 management systems (Registration No. LS4141).

Our services include the isokinetic measurement of particulate matter, velocity, temperature, and pressure profiles. Levego Environmental Services (Pty) Ltd services extend further to



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particulate matter and fume extraction plant balancing, gas cleaning plant efficiencies, dynamic particulate matter emission monitoring, calibration of automated measuring systems, and gas producer performance.

Levego Environmental Services (Pty) Ltd is uniquely positioned to offer its clients a comprehensive independent calibration service for all makes of online continuous emission monitors. Measurement services for the following are also offered, but not limited to: CO, CO₂, SO₂, SO₃, NO_x, NH₃, HF, HCl, Cl₂ metals emissions, volatile organic compounds (e.g. BTEX), semi-volatile organic compounds (SVOC), Polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzofuran (PCDF), amongst others.

Levego Environmental Services (Pty) Ltd offers a comprehensive array of environmental analysis, including the supply of specialised sampling media that is outsourced to a carefully selected group of national and international accredited laboratories.

Levego Environmental Services (Pty) Ltd can provide a range of portable analysers as outlined below.

- Portable combustion and emission analysers,
- Portable flame ionisation analysers (FID),
- Isokinetic and gaseous stationary source emissions measurement equipment
- Toxic gas analysers
- Mercury sorbent tube sampling systems
- Transportable emission monitoring systems

We offer dust fall-out monitoring in accordance with ASTM D1739 of 1970. We co-ordinate the installation of appropriate fall-out stands, site maintenance and collection of samples at the prescribed pre-determined intervals. Samples are collated and analysed in accordance with ASTM D1739 of 1970.

Levego Environmental Services (Pty) Ltd.'s ambient air quality assessments are performed using Radiello™ tubes for the following contaminants: BTEX/VOC, aldehydes, ammonia, hydrogen fluoride, nitrogen dioxide, sulphur dioxide, ozone, phenolic compounds, hydrogen chloride, etc.

We offer an odour control solution. The service includes odour assessments, odour surveys, sampling, analysis and odour modelling. Our partnership with international leaders in this field ensures that Levego Environmental Services (Pty) Ltd have a solution to meet all your odour emission requirements.

Levego Environmental Services (Pty) Ltd helps with the completion of your submission requirements to the South African National Atmospheric Emissions Inventory System (NAEIS). NAEIS is an online national reporting platform aimed at holding both air pollutants and greenhouse emissions inventories for the Republic of South Africa.

Leaking equipment, such as valves, pumps, and connectors, are a large source of emissions of volatile organic compounds (VOCs) and volatile hazardous air pollutants (VHAPs). We offer a leak detection measurements service following the requirements of US EPA Method 21 and international best practice.

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