



GASCLAM

**The World's first
in-situ borehole
gas monitor**



GasClam can be used below ground for up to three months to measure a variety of gases, with temperature, barometric and borehole pressure giving a true long term profile for the first time! It's truly the definitive method of measurement for most below ground applications.

KEY FEATURES

- Easy installation in a secure 50mm or 2 inch borehole
- Three months continuous un-manned data collection
- Methane (CH₄), oxygen (O₂) and carbon dioxide (CO₂)
- Temperature, borehole and atmospheric pressure
- Optional CO or VOC plus water depth
- Runs on two standard D-cell batteries
- Explosion Proof
- Programmable borehole venting

Advanced Gas Sensing Technologies
www.ionscience.com

GasClam

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TRADITIONAL METHODS

Using portable gas detection instruments to spot check boreholes from time to time is fraught with potential issues. Considerable published material exists that question whether the traditional method of collecting gas-data from boreholes is at all adequate.

The use of the numerous guidance notes from the legislators and enforcers would seem to indicate they too think the current methods are flawed. To evaluate boreholes effectively detailed and frequent measurements are required, particularly when events occur e.g. such as when the barometric pressure falls. Data collected on in periodic spot check basis does not give a complete picture so decisions are made reliant on historic set points rather than real trend information on the borehole being monitored.

Current issues

1. Spot check data only available.
2. Major gas events are often missed.
3. Lack of real data leads to misleading conclusions.
4. Frequent expensive site visits to take only spot readings.
5. Independent borehole profiles are just not available.

All these uncertainties led Salamander to develop the unique and patent pending GasClam which is designed as the definitive solution.



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BENEFITS

- Reduction of unnecessary site visits
- Complete data for a full site assessment
- Demonstrates full due diligence
- Meets all legislative needs
- All relevant data including barometric pressure logged simultaneously
- Data can be downloaded on site for quick analysis
- All events are captured with a time and date stamp for further analysis
- Removal of any uncertainty in gas monitoring regime
- Assists with design of gas protection measures
- Validates operation for Biogas production
- Also can monitor greenhouse-gas emissions
- A post site development monitor for extra safety
- Optional carbon monoxide (CO) or volatile organic compound (VOC) sensor for specific applications
- Optional water depth sensor where ground water influences results
- Control vent boreholes to measure concentration build up times
- Optional telemetry system for real-time monitoring on critical sites



THE GASCLAM SOLUTION FOR:-

LANDFILL

Gas generation and migration are subject to operational control on landfill sites. GasClam data can be used as the feedback to ensure control is effective particularly where Biogas is used and greenhouse-gas emission levels measured. Below ground fires as a result of spontaneous combustion can be monitored using the optional CO sensor fitted to the GasClam. An accurate assessment can be made of severity and the extent of the landfill effected this is essential for full risk assessment.

BROWNFIELD AND DISUSED COAL MINES

With GasClam, periods of continuous monitoring can be practically and economically incorporated into site Investigations. With full data available, boreholes can be profiled and the optimum monitoring programme ascertained. A time saving tool whilst reducing risks at the same time. Where sites show significant gas present these can be long term monitored to ensure the risks are fully understood before remedial actions are recommended.

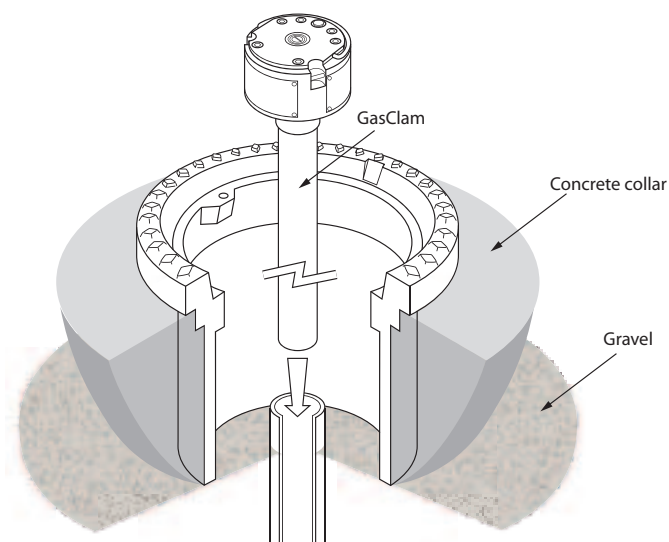
PETROLEUM STORAGE AND FILLING STATIONS

Below ground storage of petroleum is currently the norm when associated with filling stations. As tanks age and connections corrode the repair of the inevitable leak represents a significant environmental hazard. Used in some well placed boreholes the GasClam with optional VOC sensor fitted can monitor sites to ensure leakage is kept to a minimum or even indicate where repair may be necessary. After repairs or clean-up the GasClam can be used to validate the result for the local authorities or regulatory bodies. Long-term deployment produces data that can be used for management of operations and can be incorporated into risk assessments for storage facilities.

This method of leak detection is sure and certain.

CARBON CAPTURE AND STORAGE

With carbon trading a reality, carbon offsetting and storage has become a major commercial enterprise. However, it is limited at present because of disagreements and difficulties in verification of longevity of storage. The GasClam with its ability to continuously measure and the potential to use this data to calculate gas fluxes - is likely to be indispensable during the growth of this new business area.



TYPICAL APPLICATIONS

On Landfill Sites

- Perimeter monitoring using existing boreholes
- Accurate real-time measurement of Green House gases.
- Discharge of licence when used as a post-closure monitor
- Spontaneous combustion detection
- Long term monitoring

On Brownfield sites and Disused Coal Mines

- Site investigation
- Validation of any remediation untaken or needed
- After site development validation and monitoring
- General due diligence

For Petroleum/ Solvent Storage and Filling Stations

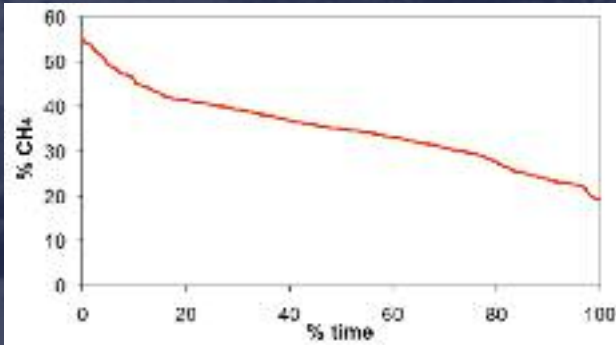
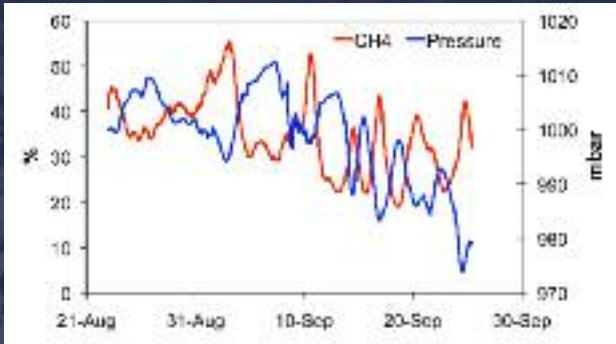
- Leak site investigation
- Perimeter monitoring.
- Early validation of effective bunding or need to repair
- Long term spillage monitoring
- Compliance to the Regulations

On Refineries

- An integral part of long term monitoring procedures.
- An independent check on other monitoring techniques.
- Incident use after spillage
- Demonstration of due diligence
- CO₂ Sequestration monitoring

Below Ground Carbon Capture and Storage

- Validation of storage sites: peat bogs, etc
- Long term site surveys for suitability
- Validation of compliance



TECHNICAL SPECIFICATION

Memory - 6300 time/date stamped readings

Power - Internal x 2 Alkaline D-cells

Battery Life - 3 months (based on hourly sampling)

Case - High Quality Stainless steel

Weight - 6 kg or 13.2lb

Dimensions - Overall Length 85cm or 33½ inches
 Borehole Tube Length 78cm or 30¾ inches
 Head Diameter 10.9cm or 4¾ inches
 Borehole Tube Diameter 4.3cm or 1¾ inches

Protection - IP-68 (continuous submersion)

Operation temperature - -5 °C to +50 °C or 23 °F to 122 °F

Approvals - CE , EMC, ATEX 0105 X, Ex II 2G, Ex d ib [ib] IIB T4

Approvals pending - IECEx UL and CSA

World-Wide Patent Pending

Exclusively sold and promoted by Ion Science Limited

Gases	Method / Type	Range	Resolution	Accuracy	Linearity
CH ₄	Infra-red	0 - 100% vol	0.01% vol	± 5% of reading ± 1 digit	+/- 2% FSD or 10% reading
CO ₂	Infra-red	0 - 100% vol	0.01% vol	± 5% of reading ± 1 digit	+/- 2% FSD or 10% reading
Oxygen	Electrochemical	0 - 25% vol	0.1% vol	± 5% of reading ± 1 digit	+/- 2% FSD or 10% reading
CO*	Electrochemical	0-2000 PPM	1 PPM	± 5% of reading ± 1 digit	+/- 2% FSD or 10% reading
VOC*	PID	0-4000 PPM	1 PPM	± 5% of reading ± 1 digit	+/- 2% FSD or 10% reading

Environment	Method / Type	Range	Resolution
Temperature	Internal Chip	-5 °C to +50 °C or 23 °F to 122 °F	1 °C or 1 °F
Barometric	Piezoelectric	800 to 1200 mb	0.1 mb
Borehole	Piezoelectric	-100 to +100 mb	0.01 mb
Water Depth*	Piezoelectric	0 to 10 m	0.1 m

Developed by Salamander



*Optional

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ION SCIENCE is ISO9001:2000 certified (December 2003)

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