Leak Measurement Techniques

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Uglemetan

Presentation Contents

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Uglemetan's expertise

- Established in 2002 under the auspices of Siberian Branch of Russian Academy of Sciences and US EPA

- Executing agency of UNDP/GEF project Russian Federation: Removing barriers for CMM recovery and utilization

- Since 2005 under the US EPA GAS STAR grant prepared:
  - Detailed report outlining the best options for methane mitigation in the Russian natural gas industry
  - Case study on the methane detection and measurement methods at the natural gas distribution companies in Russia

- Key organizer of the workshop on the Modern Technologies of Detection and Elimination of Methane Leakages from Natural Gas Systems held in Tomsk (Russia) on September 14-16, 2005

- Uglemetan's staff members got training on methane leakages detection

Approaches for the CH4 Leakages Detection in Russia NG Industry

UgleMetan

- Methods applied for the estimation of the methane emissions in NG industry in RF:

  - Balance method – for consolidated estimation of natural gas emission;

  - Analytical method – for differential estimation;

  - By types of losses – for homogeneous sectors of activities;

  - Instrumental method – periodical (scheduled).

- Gas emission registration is carried out by calculation methods according to the officially approved methodology «Methods of determination of gas flow for own technological needs of gas production enterprise and losses in gas distribution systems».

Balance Method

$$Q_R = Q_{ON} + Q_{TN} + Q_{ESD} + Q_{DL} + Q_S,$$

Q_R – amount of received gas; Q_{ON} – gas used for own needs; Q_{TN} – gas used for technological needs; Q_{ESD} – gas lost in emergency shutdowns; Q_{DL} – gas lost in the distribution systems; Q_S – gas sold to consumers.

Methods applied for the controlling methane emission

- Field control of emissions is carried out either visually (various kinds of visual inspections, including air inspections) or at a distance using a number of methods.

- A contact method indicates methane concentration levels at emission sites.

- Direct methods of monitoring of leakages along with detection and measurement allow specify the value on methane emission at gas supply facilities.

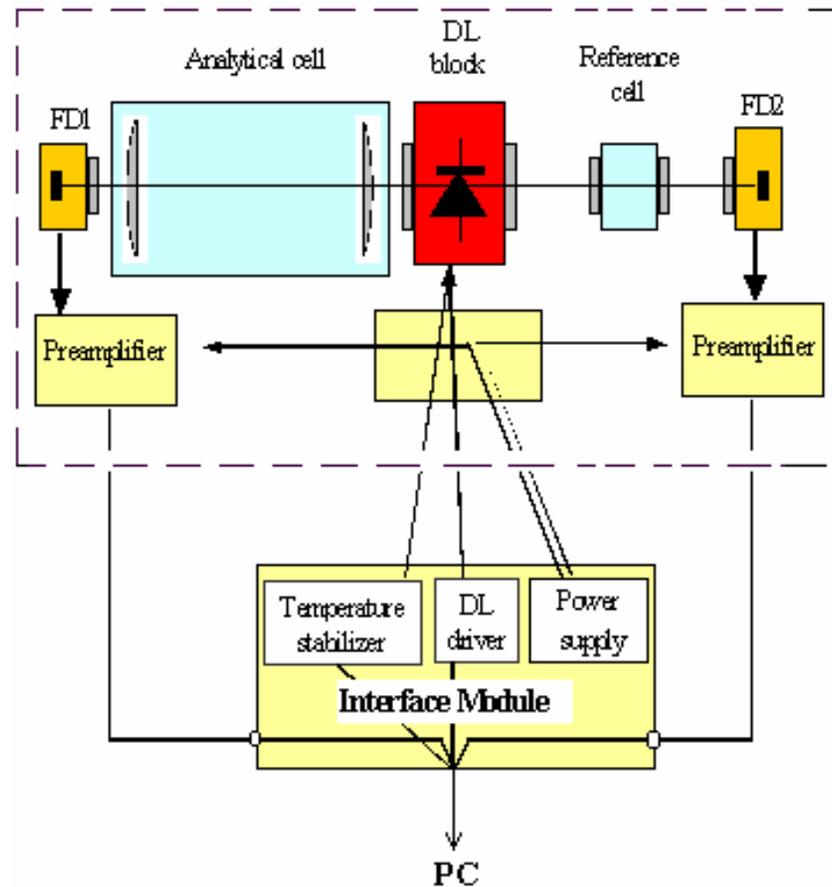# Equipment and Leakage Measurement Methods applied by Uglemetan

UgleMetan

**Universal leakage
detector chromatograph
AHT-TI**

**Set of equipment GtiSM Hi-Flo™
Sampler**

Laser methanometer with a multipass absorption Buger cell

# Search of leakages at gas distribution unit and a valve accordingly

Journal and Leakage Amounts Registration

#	Unit	Leakage location	Concentration, %	Flow rate, m/s
1	BGDU	Filter cover (FGV-50/1)	0.2	1
2	BGDU		–	–
3	BGDU		–	–
4	Gas valve VD (Diameter =100)		–	–
5	BGDU	Manometer threaded joint	0.2	1.5
6	Gas valve VD (Diameter =100)	Flanged joint	0.2	1.7
7	Gas valve VD (Diameter =300 & 500)		–	–

Results of Gas Leakage Amounts Calculations

Unit	Flow rate, m/s	Concentration, %	Leakage amount	
			m^3/hour	m^3/year
BGDU (filter)	1	0.2	0.014	123.8
BGDU (manometer)	1.5	0.2	0.02	185.8
Gas valve VD (Diameter =100) (flanged joint)	1.7	0.2	0.024	210.5

Low methane concentrations measurements
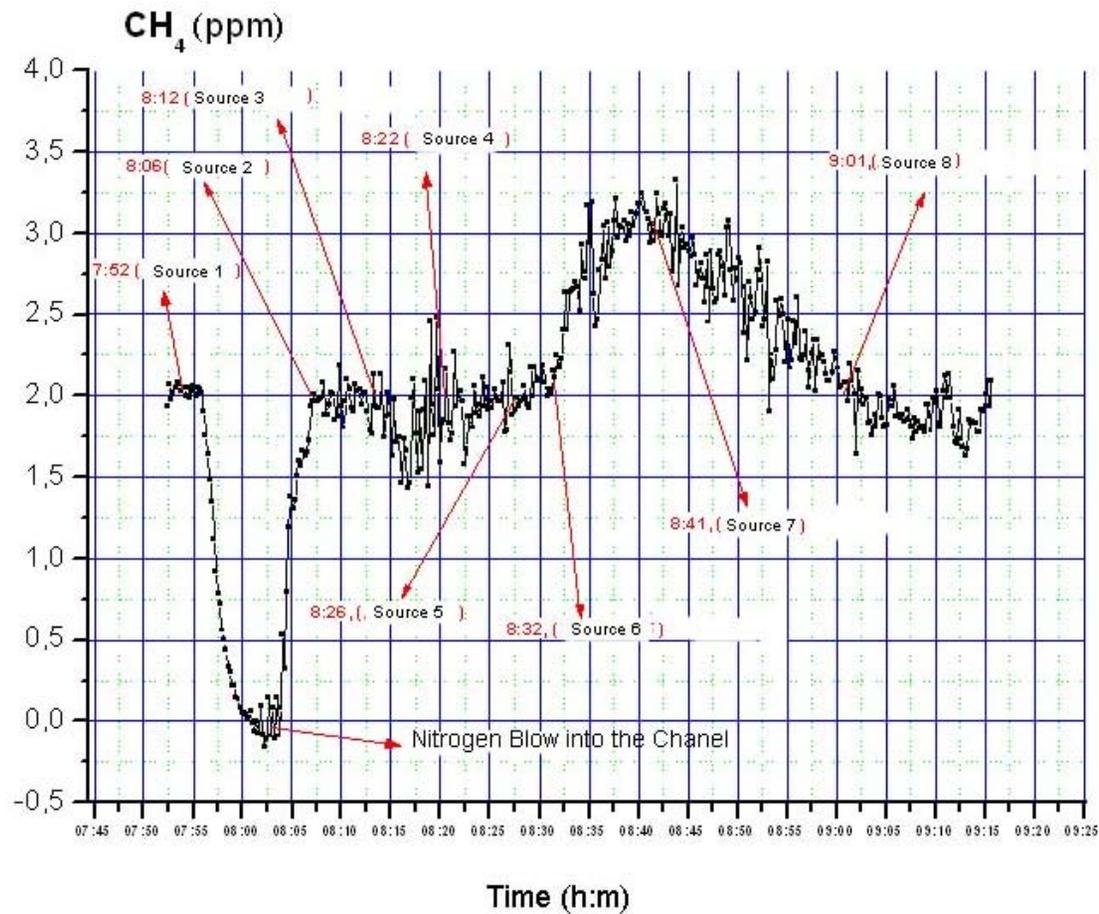
Conclusions

- In RF Methane emissions are calculated as a difference between incoming and outgoing amounts of gas and also by using the emission factors.

- Emissions are not usually physically measured at every production, processing and distribution facility in RF NG industry:

    - low prices at the internal market sometimes can make loosing gas cheaper than using emission control technologies

    - lack of equipment for the direct measurements of the methane emissions in winter time

    - Involving independent companies for the auditing the methane emissions might be efficient.

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