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LDAR application

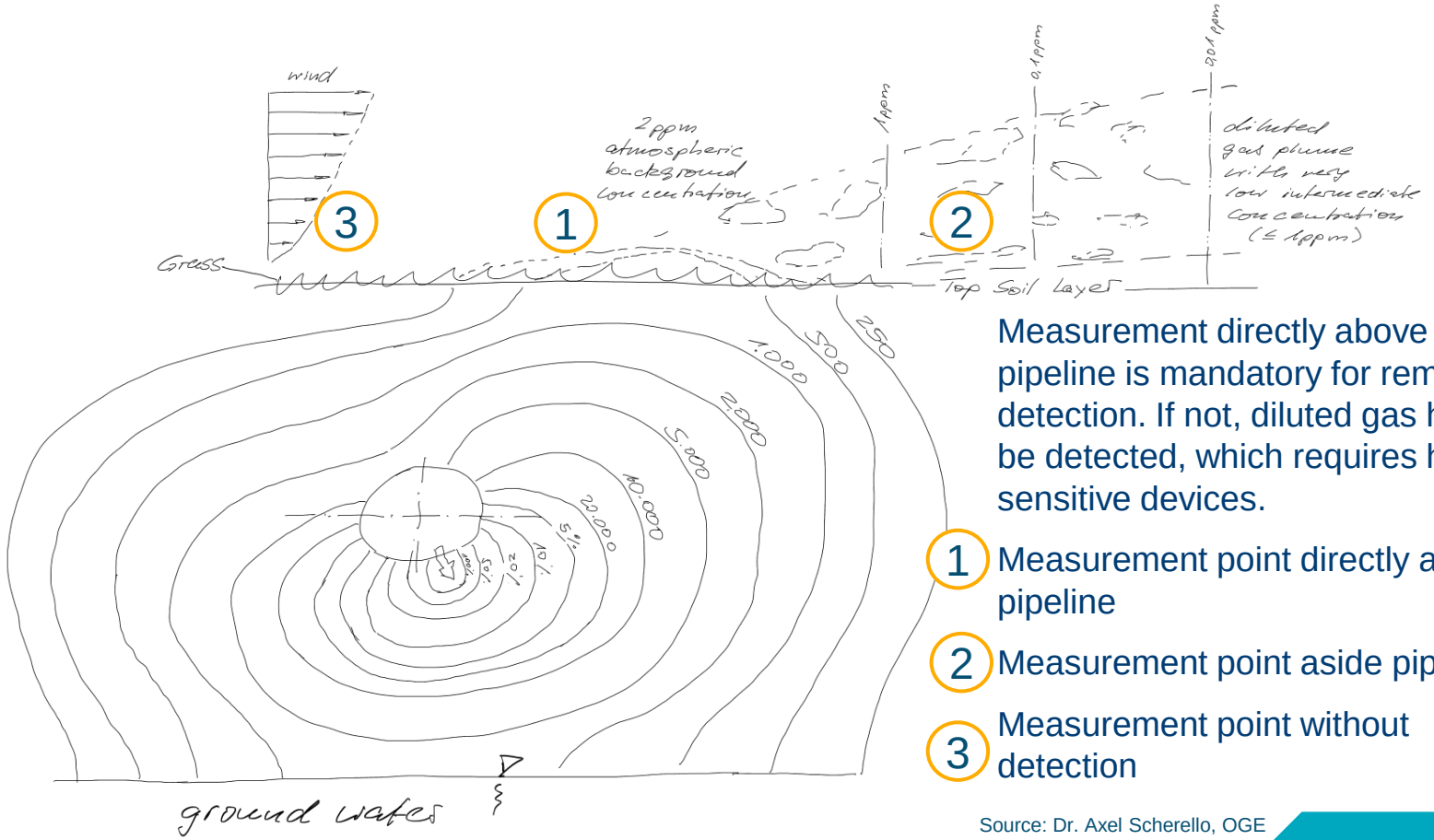
additional response to ECs questionnaire an LDAR technologies and technology application

Authors: BDEW, DVGW, FIGAWA, FNBGas

Basics

- In order to find gas releases, not only a suitable technology but also its application is decisive.
- The combination of detection technology and application personal is the important factor for finding leakages.
- EC's questionnaire is using words like "mobile", "handheld" and "airborne". It is not clearly defined how these platforms or technologies are applied.
- In order to fulfil the requirements off the EU methane regulation LDAR campaigns have to be applied on regular basis.
- To do so, high speed survey technologies are required. This means flying is preferable to driving which is preferable to walking.
- On the other hand detection accuracy of walking surveys is better than the detection of driving services. Airborne gas remote detection is on the same level as walking surveys only if German gas guideline G 501 is fulfilled (only four pipeline pressures above 5 bars absolute).

Underground leakage – background

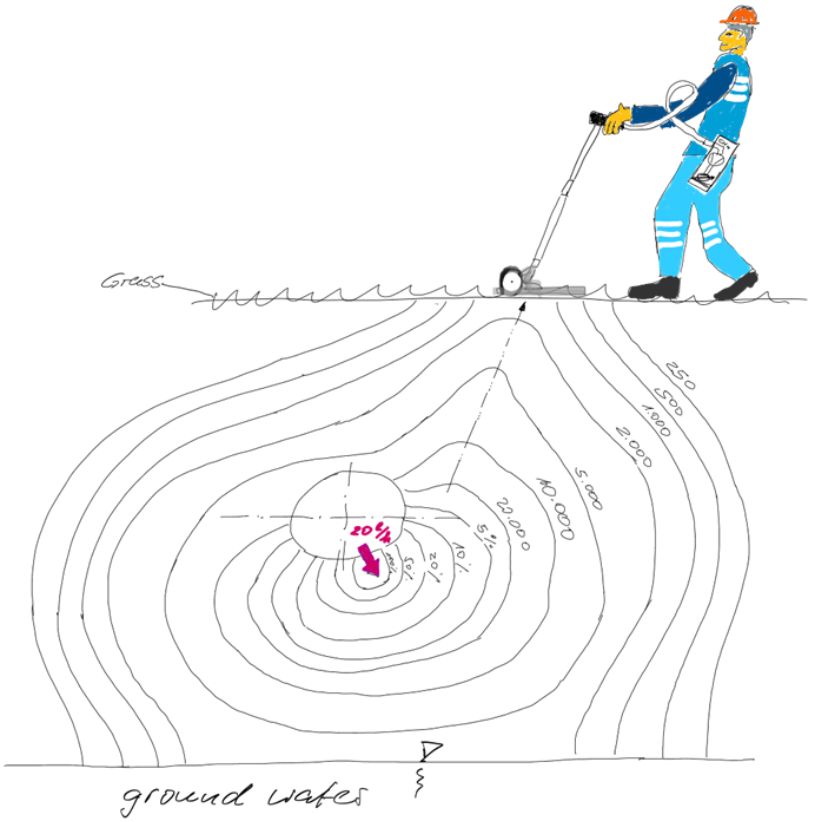


Measurement directly above pipeline is mandatory for remote detection. If not, diluted gas has to be detected, which requires highly sensitive devices.

1. Measurement point directly above pipeline
2. Measurement point aside pipeline
3. Measurement point without detection

Source: Dr. Axel Scherello, OGE

Underground leakage – suction probe application



If suction probes are applied with gas measuring devices, the pumping creates a vacuum which causes the gas to migrate in the direction of the extraction point. Here the extraction point is a bell type probe.

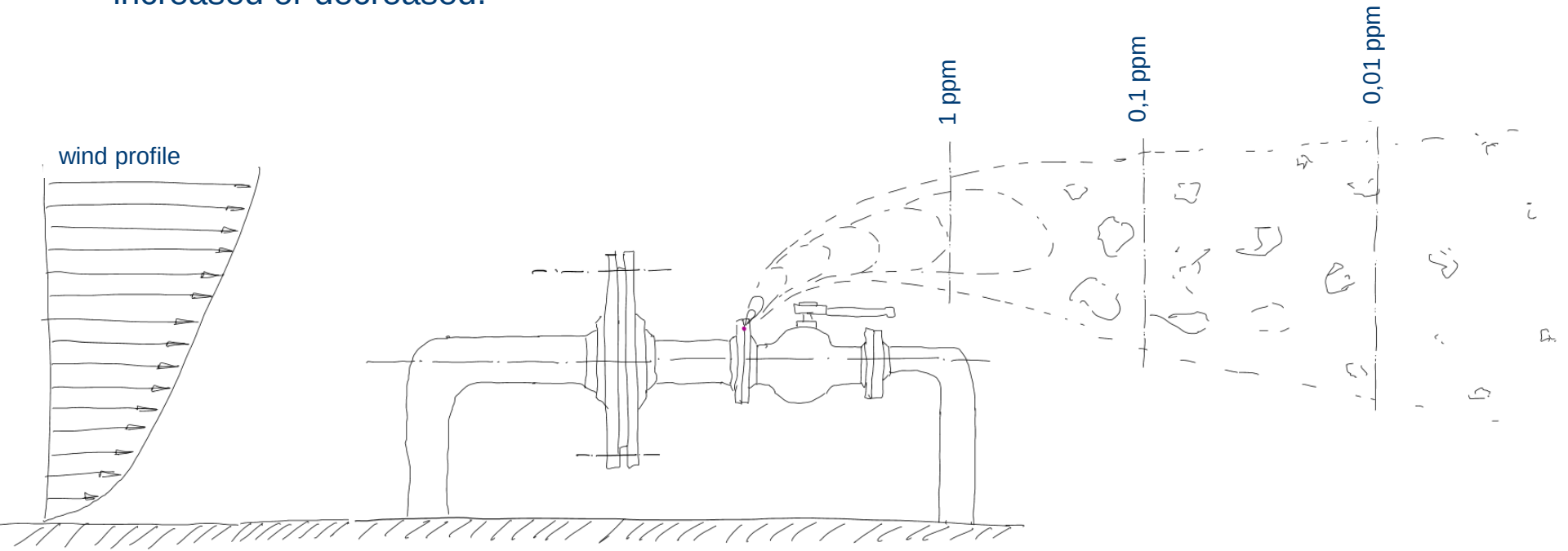
The concentration of methane is more than doubled based on this application method.

Conclusion:
If a gas detection device with a pump is applied directly above an underground gas release a minimum detection limit (MDL) of 1 ppm is completely sufficient to find even smallest leakages. An MDL of 0.1 ppm will not lead to an increased number of detected gas releases.

Source: Dr. Axel Scherello, OGE

Above ground leakage – background

Based on atmospheric movement gas will rapidly be diluted by the wind and gas concentrations will exponentially decrease with the distance from the source. Depending on wind speed and stability class (Pasquill scale) dilution will be increased or decreased.



Source: Dr. Axel Scherello, OGE

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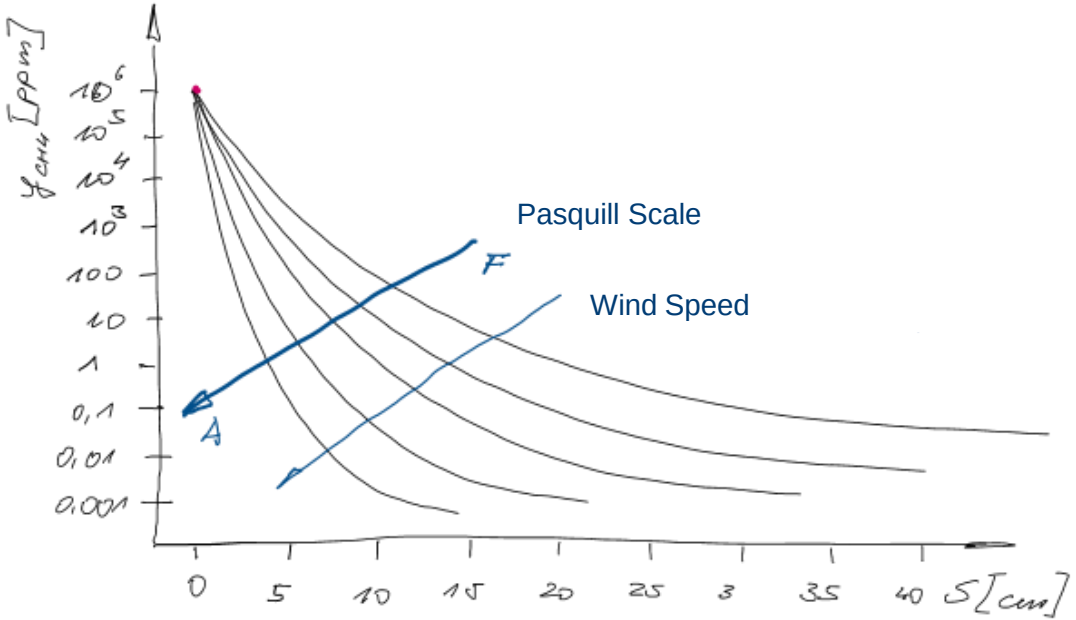
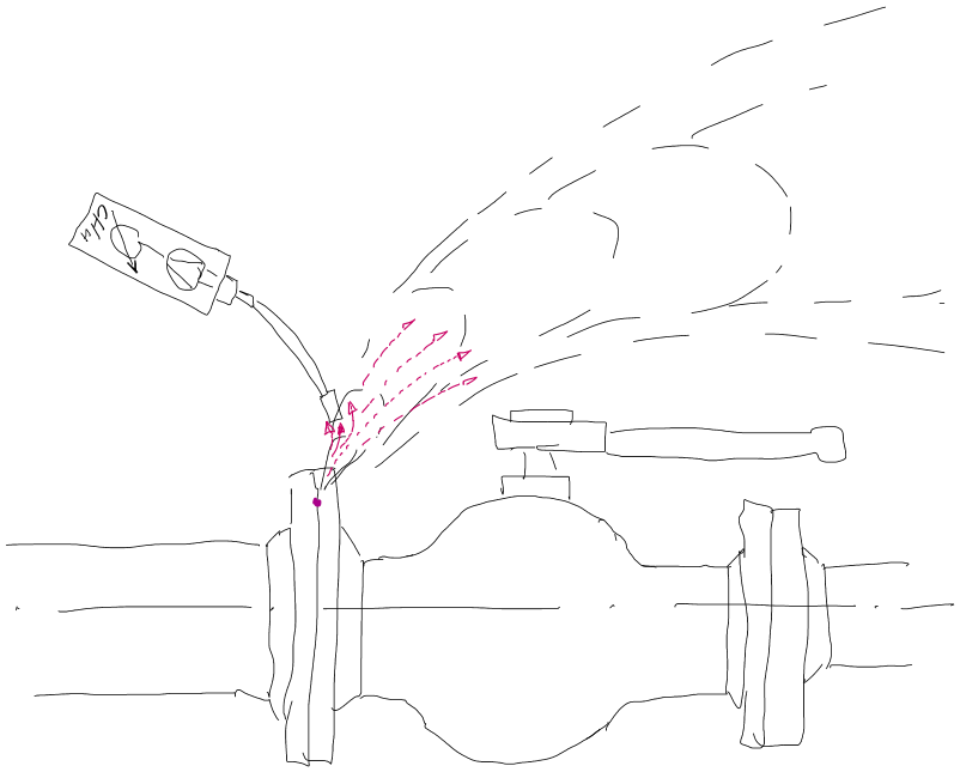


Source: Dr. Axel Scherello, OGE

Above ground leakage – suction probe application



Conclusion:

Measurement in the close vicinity of the source realises a detection even of a very small gas release – especially if a pumping device is applied. “ppm“-devices will fulfil this task successfully. The application of “ppb“-devices will not increase the number of findings.

Only if staff does not know where possible gas release points are, handheld “ppb“-devices may be useful.

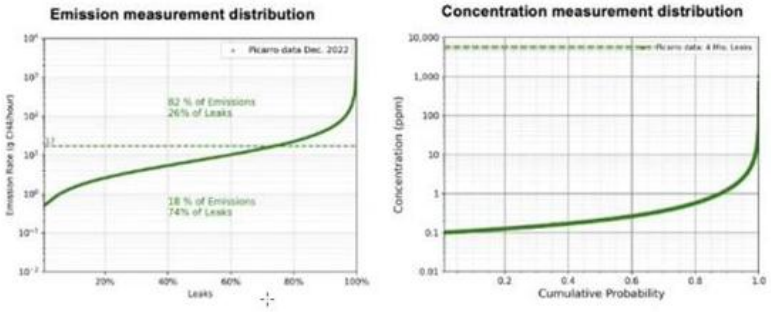
If the measurement takes place in a distance of more than half a metre, real low MDL are required.

Remote devices like OGI or handheld TDLAS have to be precisely targeted towards the source in order to detect a possible release.

Source: Dr. Axel Scherello, OGE

Summary

Device	MDL	Statistics
Handheld with suction probe (according Standard DVGW G 465-4-2)	1 ppm	100% of existing leaks if applied close to release point
Mobile (car) over pipeline (according Standard DVGW G 465-4-3)	1 ppm	100% of existing leaks if applied above pipeline with porous surface
Mobile (car) aside of pipeline (according Standard DVGW G 465-4-4)	0.1 ppm	~ 100% of leak indications according to MDL
Airborne (according Standard DVGW-G-465-4-5, and DVGW G 501)	100 g/h at underground source	100% of leak indications for pipelines above 5 bar pressure
OGI (according Standard DVGW-G-465-4-7)	17 g/h at 2 m distance from source and 5 K temperature difference	Type 1, above ground
Handheld TDLAS (according Standard DVGW-G-465-4-6)	150 ppm m at 5 m distance from source	Type 1, only for above ground installations



The current dataset include all measurements performed by Picarro until December 2022 with PCubed EQ version 6.5.

Statistics of Picarro are related to concentration measurements of diluted gas in several meters distance of a release point.

Using handheld devices with MDL 1 ppm and a suction probe will find every gas release, if applied close to source.

Lower MDL for handheld devices with suction probe will not lead to better or more detections!

- Further Information and Contacts:

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