UA TRANSMISSION SYSTEM OPERATOR

Positive experience in implementing a systematic approach to the process of detecting and eliminating methane leaks into the atmosphere at facilities of GTS

Slobodian Mykyta, PhD

09/13/2021

History

Stages	Date	Stages description	
First mobile laboratory	2005	In 2005, with the support of the US Global Methane Initiative, the first mobile laboratory for detecting and eliminating natural gas leaks from GTS equipment was purchased at UMG Cherkasytransgaz (Ukrtransgaz).	
Exploitation experience	2005-2011	During 2005-2011, the mobile laboratory for detection and elimination of natural gas leaks inspected all GTS equipment of the UMG branch of Cherkasytransgaz. These works had a positive effect in the detection and elimination of natural gas leaks.	
Scaling	2011 - 2019	Given the positive work, in 2011 five more identical mobile laboratories were established to detect and eliminate natural gas leaks from GTS equipment.	
Unbundling	2020	Following the unbundling of NJSC Naftogaz of Ukraine, five mobile laboratories for detecting and eliminating natural gas leaks from the equipment were transferred to GTS Operator of Ukraine LLC	

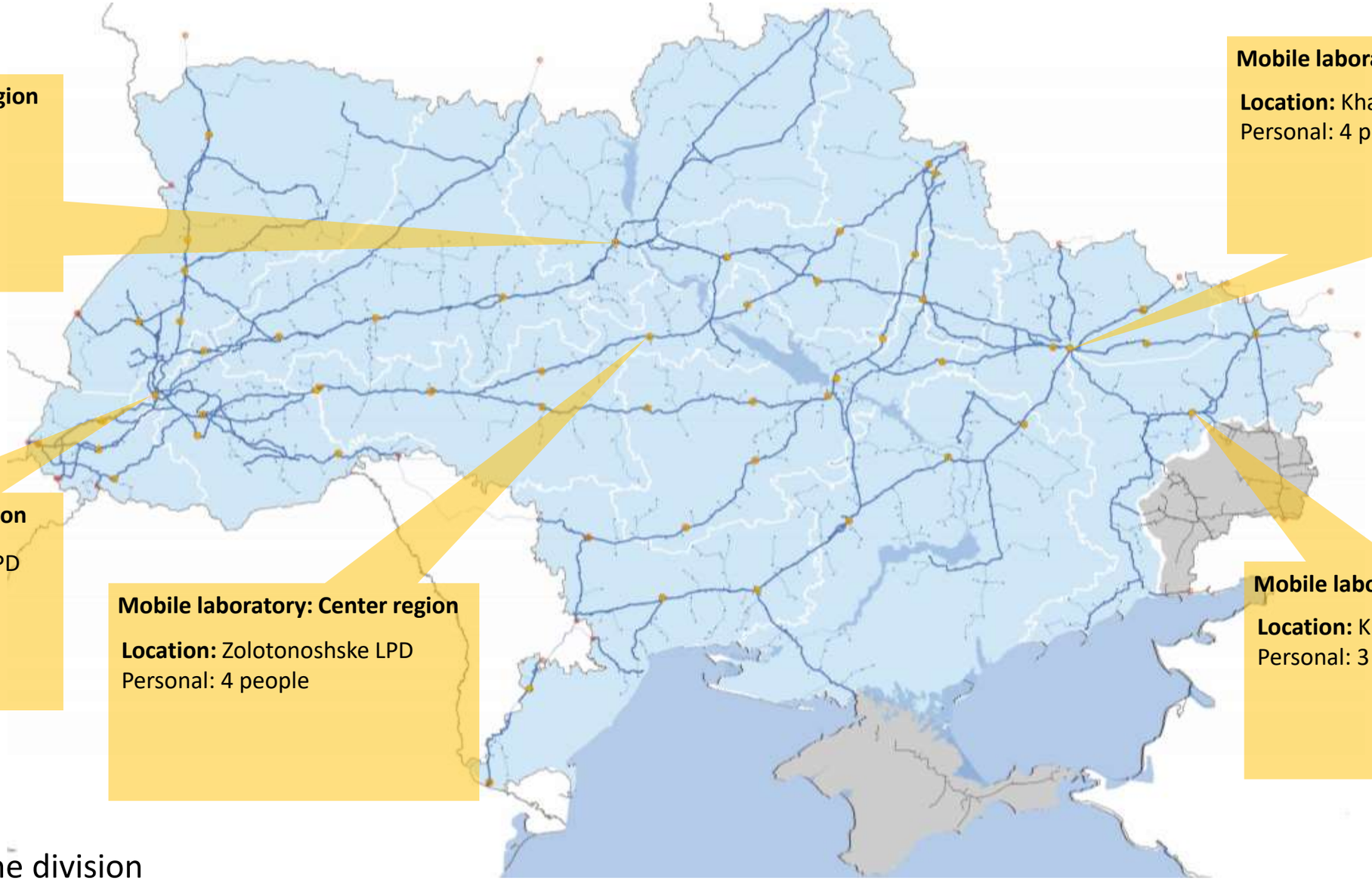
Location of mobile laboratories
LLC “Gas TSO of Ukraine

Mobile laboratory: North region

Location: Boyarske LPD
Personal: 4 people

Mobile laboratory: East region

Location: Kharkivske LPD
Personal: 4 people



Mobile laboratory: West region

Location: Bohorodchanske LPD
Personal: 3 people

Mobile laboratory: Center region

Location: Zolotonoshske LPD
Personal: 4 people

Mobile laboratory: East region

Location: Kramatorske LPD
Personal: 3 people

*LPD – Linear pipeline division

Mobile laboratories for detection and elimination of natural gas leaks from GTS equipment

The main task is to search for and measure natural gas leaks from GTS equipment, as well as to eliminate leaks by filling the problematic fittings with gas-sealing mastics.

As a result of the work carried out by these laboratories, a database on sources of leaks and their intensity has been accumulated. The information is constantly updated and updated. There is also a methodology that uses the above information to calculate the amount of natural gas (methane) leaks from a specific facility over a period of time.

Supporting the operation of such laboratories, their expansion and the provision of modern instruments and additional equipment will help meet the requirements of the EU strategy to reduce methane emissions.

Methane detector

Methane detector is sampler unit Hi Flow Sampler structurally safe tool powered by a built-in battery. It provides the ability to accurately measure the volume and intensity of natural gas leakage from any pipeline fittings and seals at the facilities main gas pipelines.

Method electronic indication of natural gas leakage is carried out by the device Hi-Flow Sampler «Bacharach», thanks to the device Hi-Flow Sampler «Bacharach» the mobile laboratory can determine the volumetric amount of methane in l/min, ie to determine the intensity and amount of gas leakage from the place of leak detection.

Leakage intensity is measured by sampling at high speed (from 1.42 to 297 l/min), to fully capture the volume of gas leakage from the equipment unit. Accurate measurement of the sample flow rate and the concentration of natural gas in this flow allows to calculate the intensity of the leak. The device automatically compensates for the difference in the specific gravity of air and natural gas, thus ensuring the accuracy of the calculation of the leakage intensity.

1. Sealweld sealing injector guns are specially designed for the safe injection of viscous sealants into pressure valves. Sealweld Uni-Seal and ACTIV-8 packing guns use unique pneumatic-hydraulic motors and use "direct push" technology, which allows to inject even the most viscous and heavy sealants simply and efficiently.

2. The SPEEDAIRE air compressor with the petrol drive is intended for ensuring work of the pneumatic equipment. Its compactness and mobility allows to carry out stuffing of shut-off valves in hard-to-reach areas without involvement of a large number of technical and human resources. The compressor is easy to operate and maintain and does not require specialized education.

3. Methane detector - sampler Hi Flow Sampler structurally safe tool powered by a built-in battery. Provides the ability to accurately measure the volume and intensity of natural gas leakage from any pipeline fittings and seals on the main gas pipelines.

4. When eliminating leaks, the laboratories use high quality mastic such as:

Synthetic sealant, which contains fine particles of teflon based on synthetic oils, resistant to hydrocarbon environment. It’s used in threadedjoints, gaskets, packing boxes of shut-off equipment. It is pumped by high pressure pump for plastic ink (for pressure up to 70 MPa).

ML work planning

Detection and elimination works of natural gas leaks are carried out in accordance with the approved and agreed annual schedule. The specified Schedule is drawn up in such a way that all compressor stations are subject to inspection during the year, and all other production facilities – at least once every 2 years (GDS, GMS, valves of LP MG, etc.).

Plan form

The name of the unit and the facility of work	Planned period of works, (date)	Date of the last inspection of the facility	Note
1	2	3	4
1. Krasylivka PS of Berdychiv LPMPD			
1.1. CS– "Krasyliv"	01.03.-05.03.21	23.09.-25.09.20	

Leakage rate

Definition of natural gas leakage volumes from communications and equipment GTS facilities is determined on the basis NDTOV 07-003: 2019 «Methods for determining the volume of natural gas consumption for technical needs during its transportation by the gas transmission system», using the appropriate adjustment factor, which is determined on the basis of actual data from the last laboratory survey of gas leaks at the production facility.

Register of shut-off valves

To effectively manage the process of detecting and eliminating natural gas leaks and maintenance of GTS facilities in the most leakproof condition a unified register of monitoring problematic shut-off valves has been developed . The specified register is a basis for decision-making on replacement problem shut-off valves (from which leaks cannot be eliminated for technical reasons) more than 4000 units of valves.

No.	Region	LPMPD	CS	GDS	LP MG section	Other facility	Type of valves	DN, mm	Station number	Other source (flanges, etc.)
1	Central	Kremenchuh	KS-14					15	GPU No.1, flow control valve of pilot gas withdrawal on control of the valve #1, by connection	

Expansion of material base.

In addition, in 2021, as part of the strategy to reduce methane leaks, 17 kits were purchased with repair kits for packing technological equipment with sealing mastics of the type: "Ironside Lubricants LT - 4.54" to provide production units with gas-sealing equipment.

The specified equipment will allow to carry out work to eliminate leakage of shut-off valves by the forces of departments, without the involvement of mobile laboratories, for which the leakage control function remains.

As of today, the equipment is located at production facilities, appropriate training of personnel is being carried out to work with it.

Vision for further development of reduction natural gas leaks

First of all, to include in the repair plans the valve units on which the leaks are instrumentally confirmed by laboratories.

Carry out the procurement of problem valves and, first of all, replace those with the largest origins leaks.

Further annual monitoring of valve units by existing laboratories and prompt elimination of new leaks.

Equipping the laboratory with equipment for detecting and measuring methane leaks from underground equipment of INSPECTRA LASER type.

For expanded capabilities of mobile laboratories, it is necessary to purchase a camera for gas leak detection EyeCGas 2.0 of the FLIR 320 GX type, which will allow you to instantly detect leaks from leaking equipment, reduce the duration of the leak detection procedure by several times and, accordingly, accelerate its volumetric determination (instead of saponification).

Additional supply to all industrial sites of gas-tight equipment to provide all industrial sites with it (procurement of 25 sets)

Approve the plan for reducing natural gas leaks for the period 2022-2024, indicating the actual reduction indicators.

UA TRANSMISSION SYSTEM OPERATOR

Thank you for attention!!

Slobodyan Mykyta, p.h.d., e-mail: slobodyan-nb@tsoua.com