



Mature Based for New Solutions Conference

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Management of low capacity wells on the East Slovakia Gas fields.

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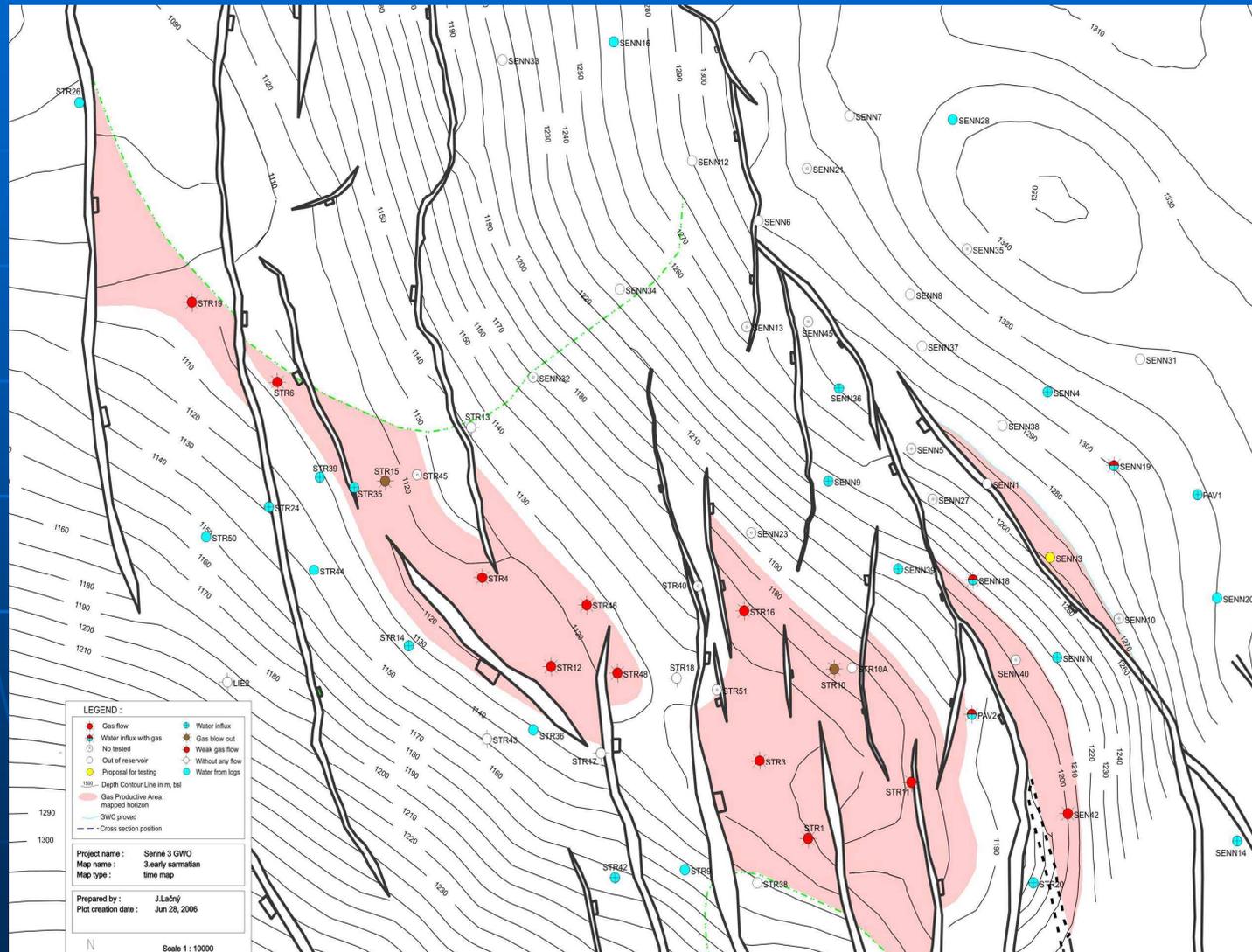
Location of the Gas Fields on the East Slovakia



Basic characteristics of the Gas Fields on the East Slovakia

- *Start of gas production in 1966*
- *Depth of deposits: 500 – 2300 m*
- *Multi-layer deposits*
- *Type of Gas: from dry gas to wet gas, methane 98% - 78%*
- *Content of Gas condensate: up to 0.160 kg/m³*
- *Up to 80% overpressured deposits*
- *Temperature gradient: 0.058 °C/m*
- *Reservoir permeability: 0,1 – 70 mD*
- *Average cumulative gas production per well: 29,9 MMm³*
- *Average recovery factor: 75 %*
- *Total number of produced wells: 165*

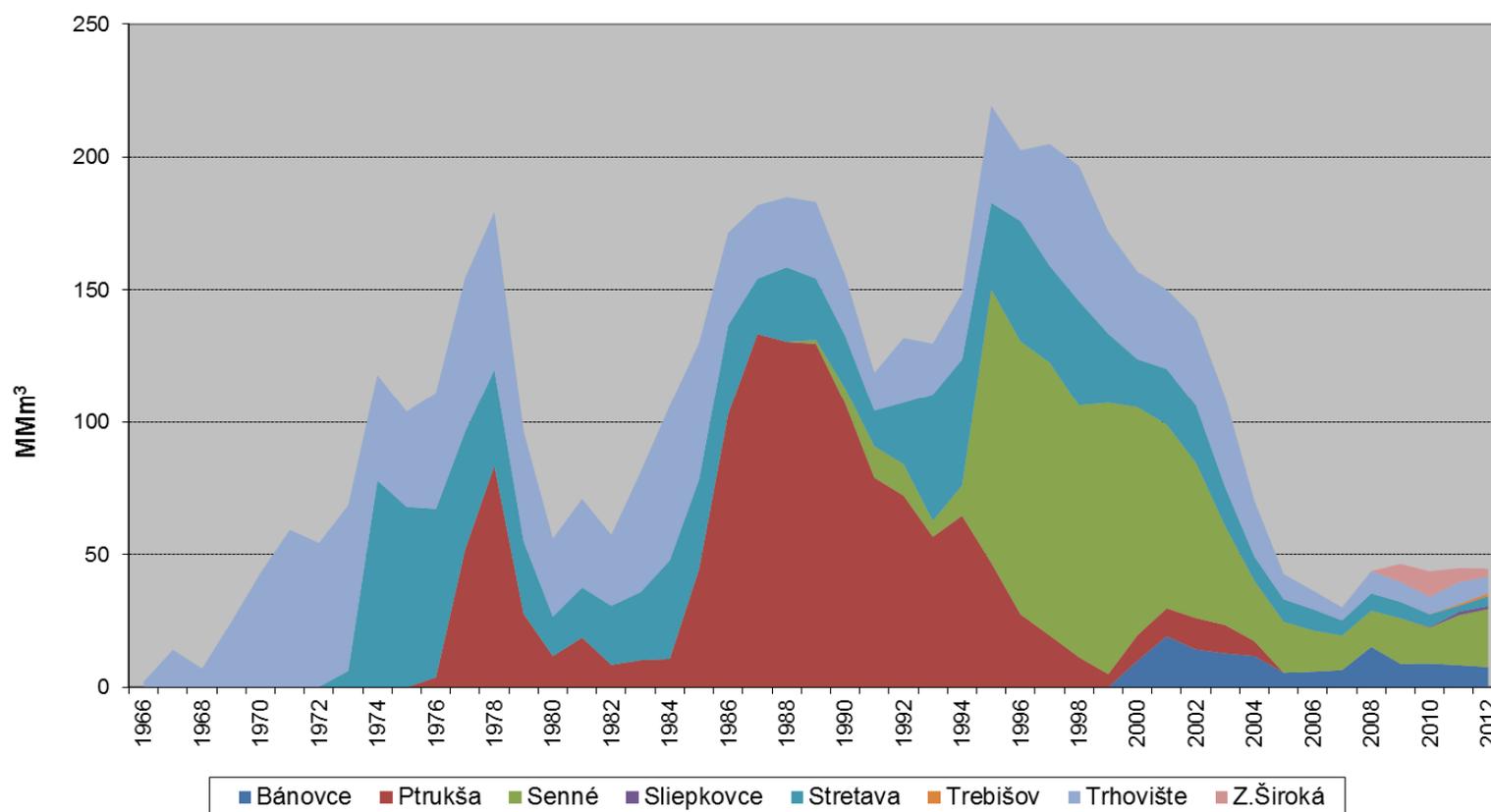
Sample of geology: Gas Field Stretava, maps on the surface of 3rd early sarmatian horizon



Production history of East Slovakia Gas fields.

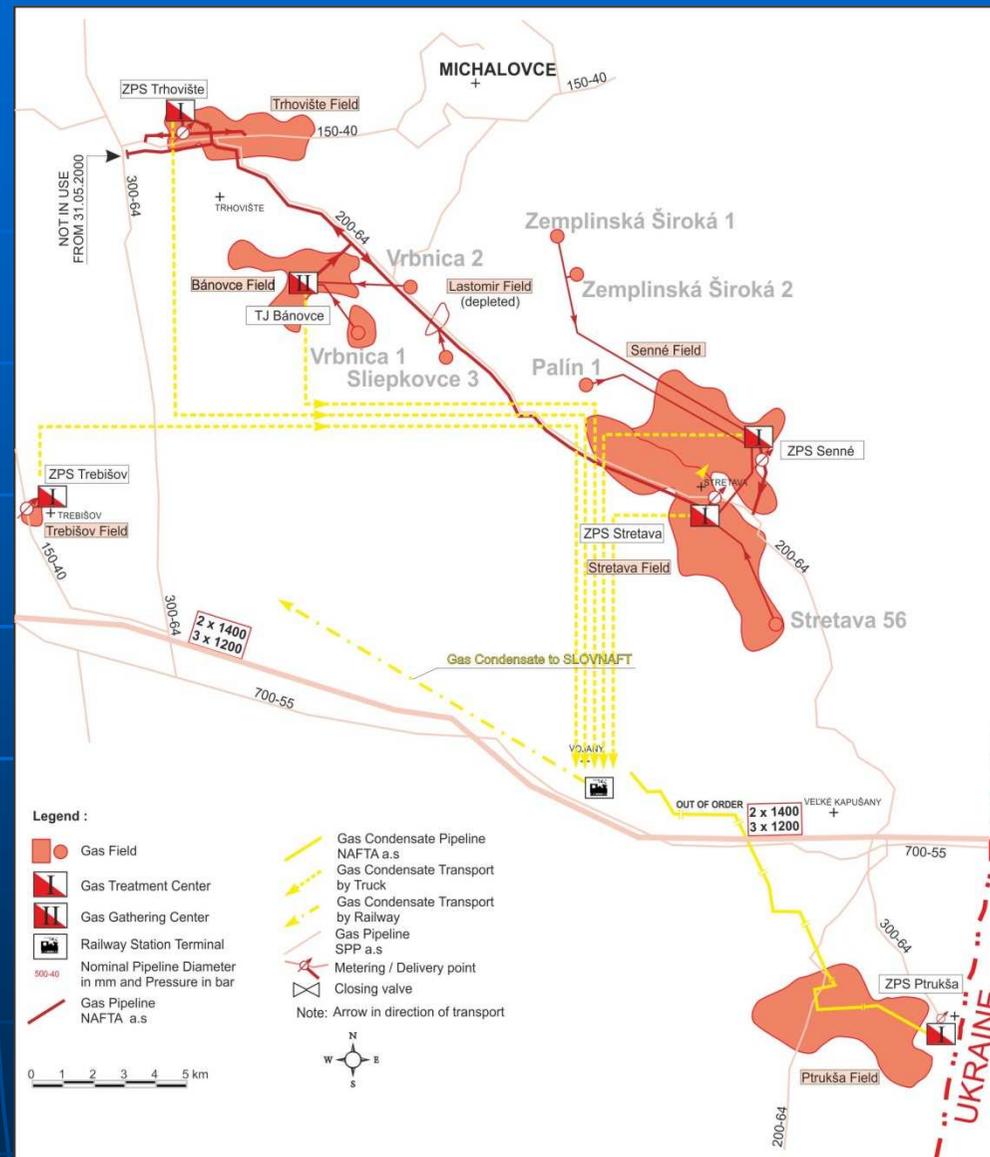
Total gas production: 4 930,9 MMm³

Total gas condensate production : 266,0 ths tons

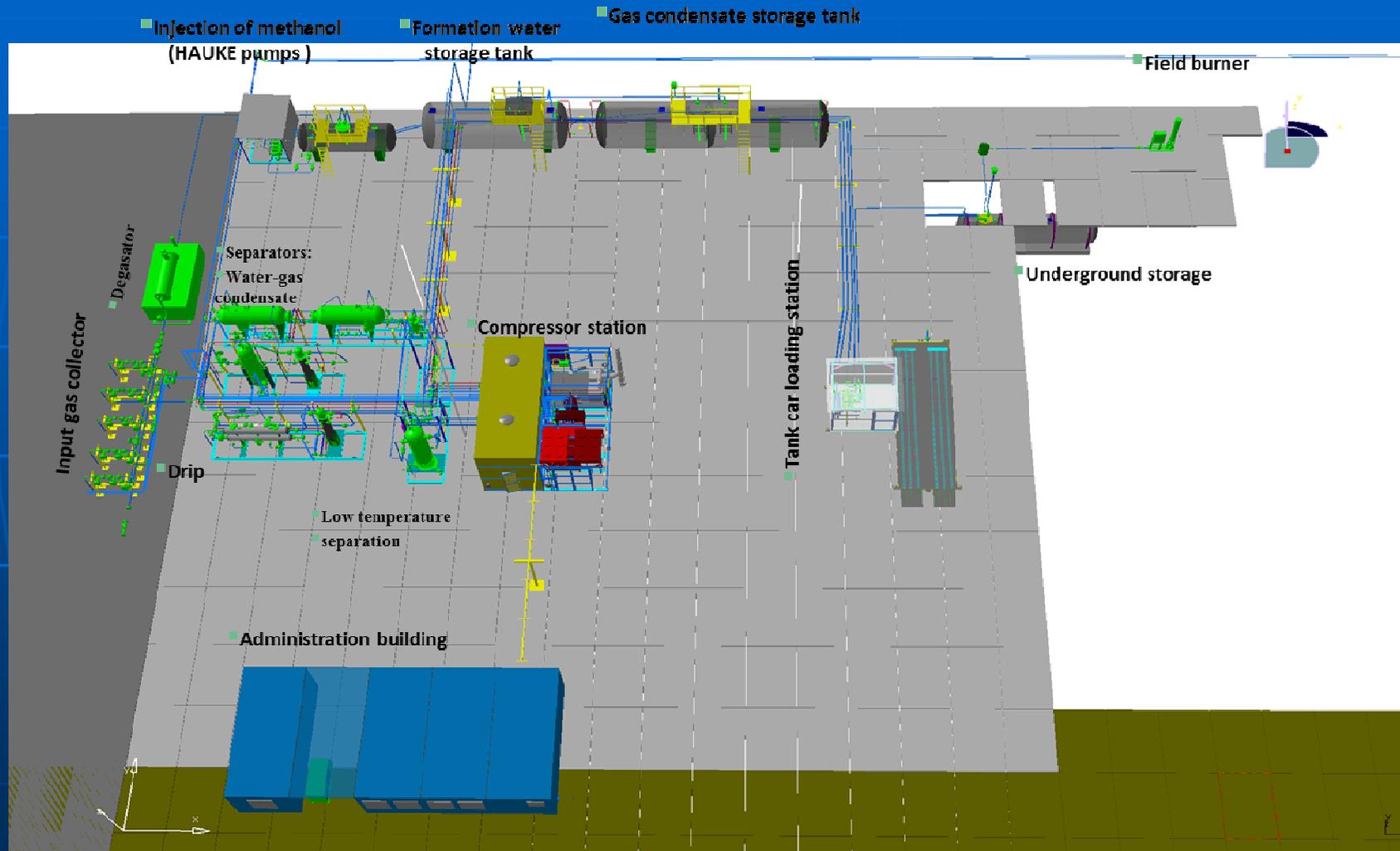


Connection of Gas fields to gas distribution system.

- 4 Gas treatment centers
3 centers equipped with compressor plant
- 3 delivery points
- customer pipeline pressure
3,0 MPa



Situation of Treatment Centre ZPS Trebišov



Increasing of gas recovery – the most used methods on the East Slovakia Gas fields.

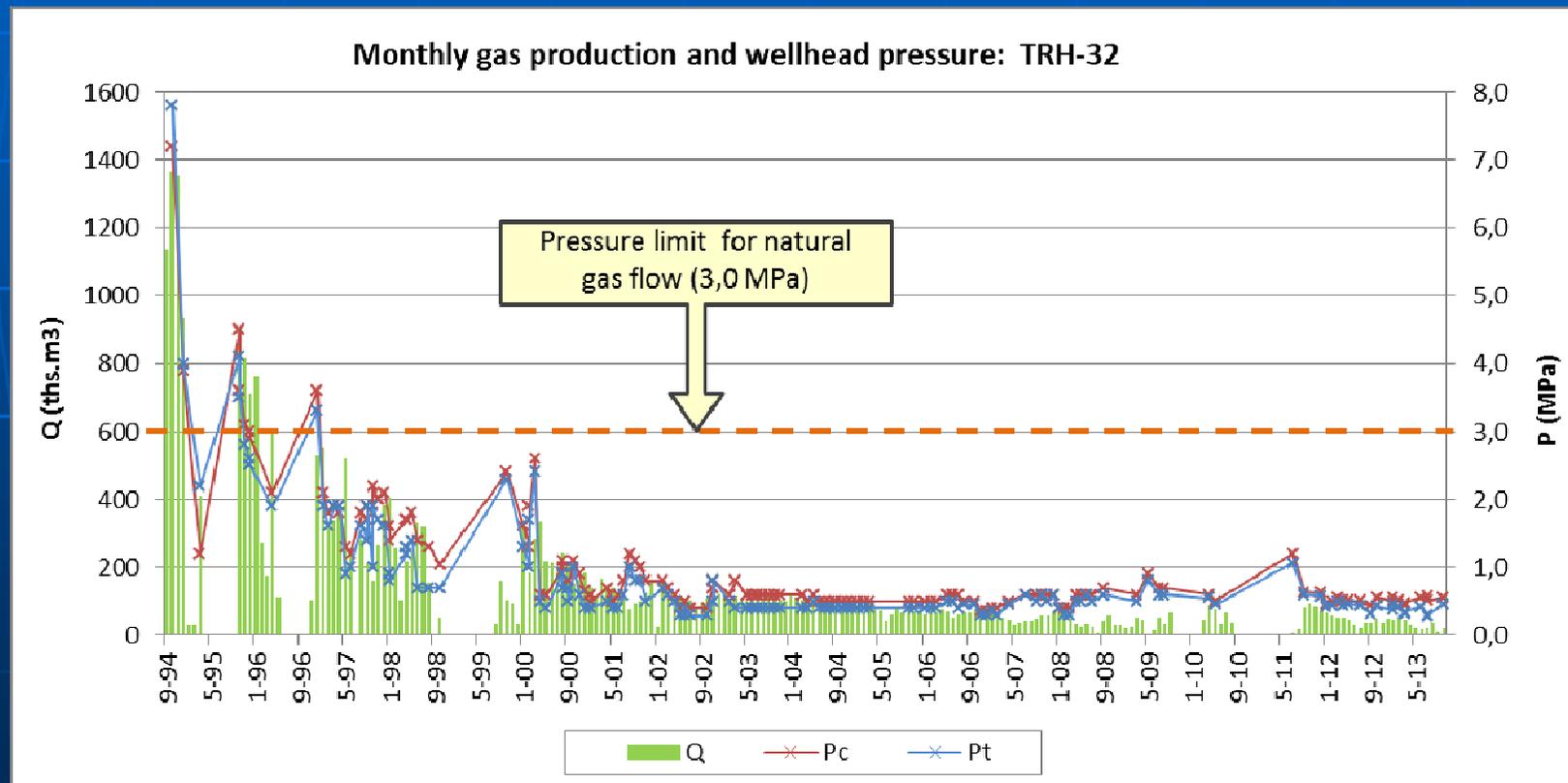
- ***compression of gas*** – if working wellhead pressure < 3,0 MPa
(pressure limit for distribution pipeline)
- ***mounting of plunger lifts*** – very effective „no emissions“ way for lifting of liquid from bottom hole (decreasing of venting wells to the atmosphere and/or flaring)
- ***foaming agents usage*** – least costly application for unloading of gas wells (non-effective for gas condensate)
- ***optimization of diameter of production tubing*** – 2 3/8“ is standard
- ***reservoir stimulation (hydraulic fracturing)***

Example of high portion of gas compressor utilization:

Well: Trhovište 32

Cumulative gas production: 29,1 MMm³

Gas production via compressor : 19,5 MMm³ (67,0 %)

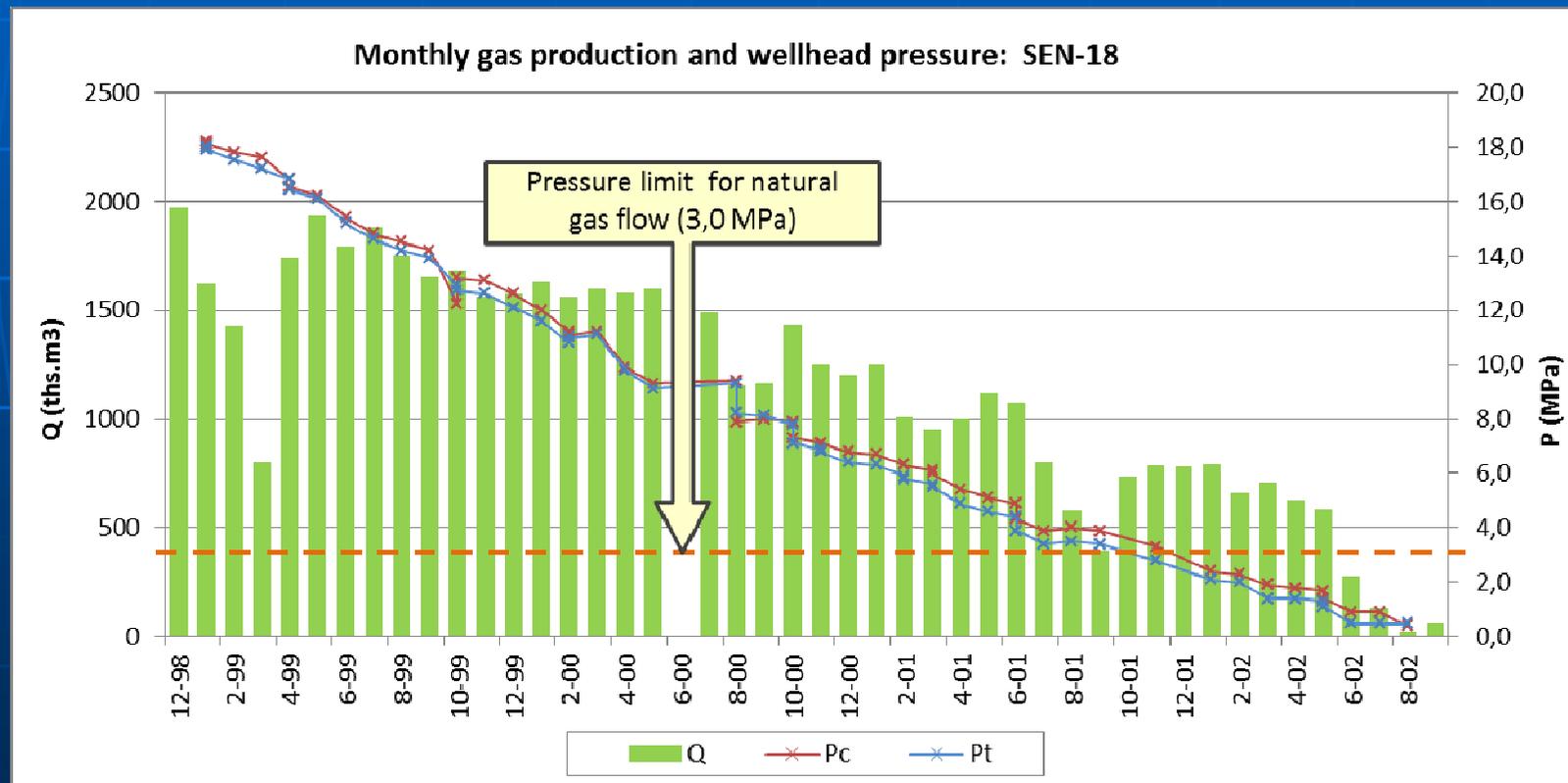


Example of low portion of gas compressor utilization:

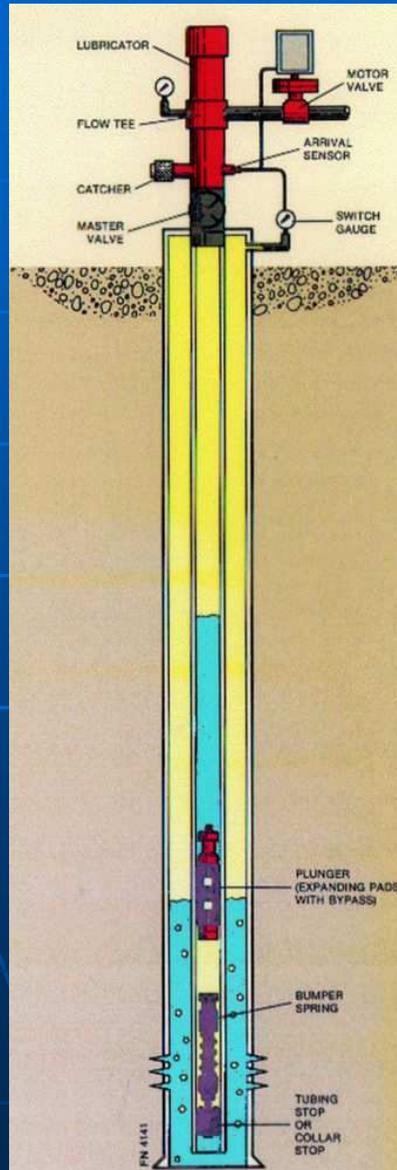
Well: Senné 18

Cumulative gas production: 51,4 MMm³

Gas production via compressor : 4,6 MMm³ (8,9 %)



Scheme of typical plunger lift installation



Examples of mounting of surface equipment on the wells

Bánovce 30

Senné 13



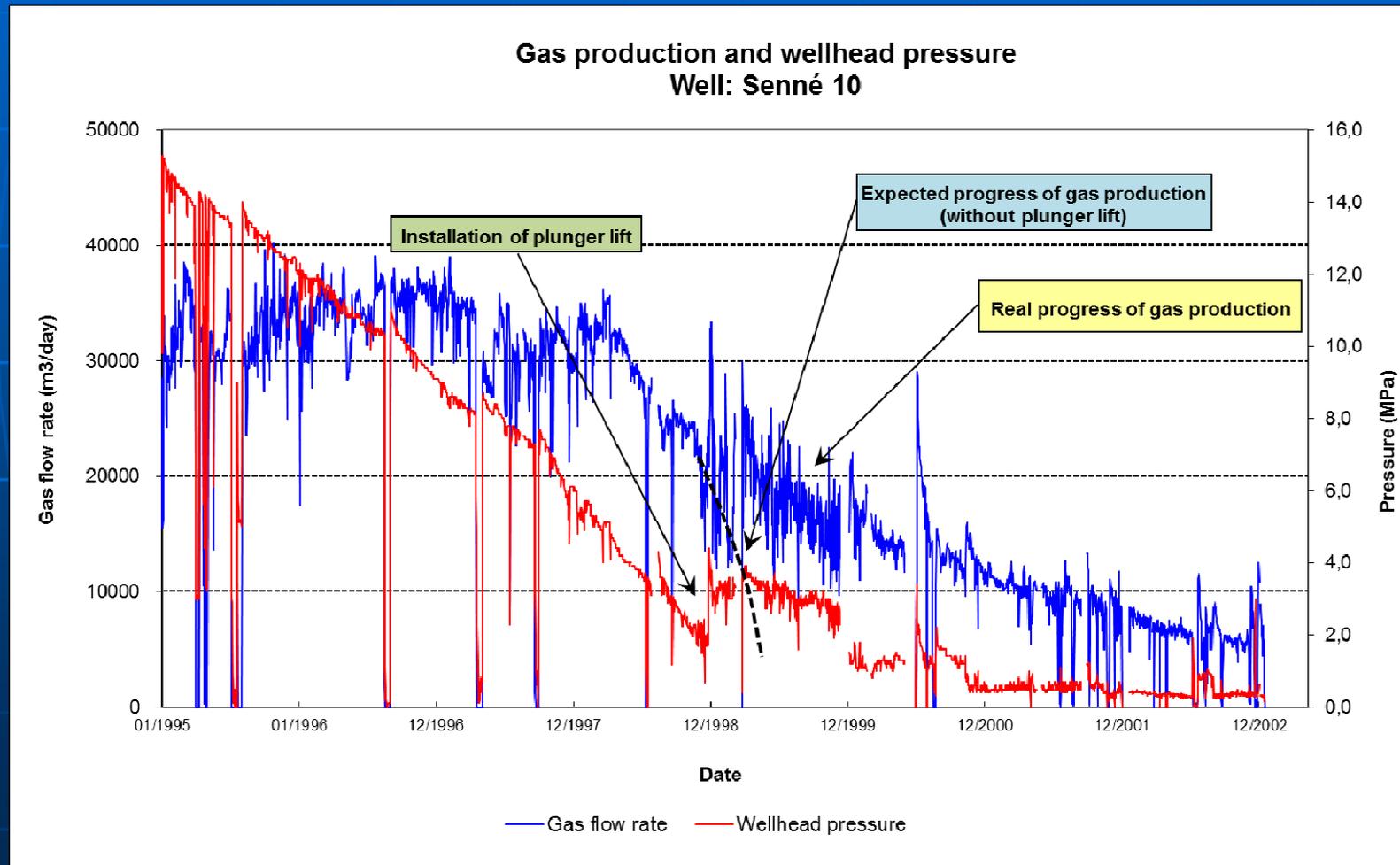
Example of plunger lift utilization:

Well: Senné 10

Depth of horizon: 1634,0-1646,0 m (2 intervals)

Cumulative gas production: 58,8 MMm³

Gas production with plunger lift: 15,4 MMm³ (26,1 %)



Example of plunger lift efficiency:

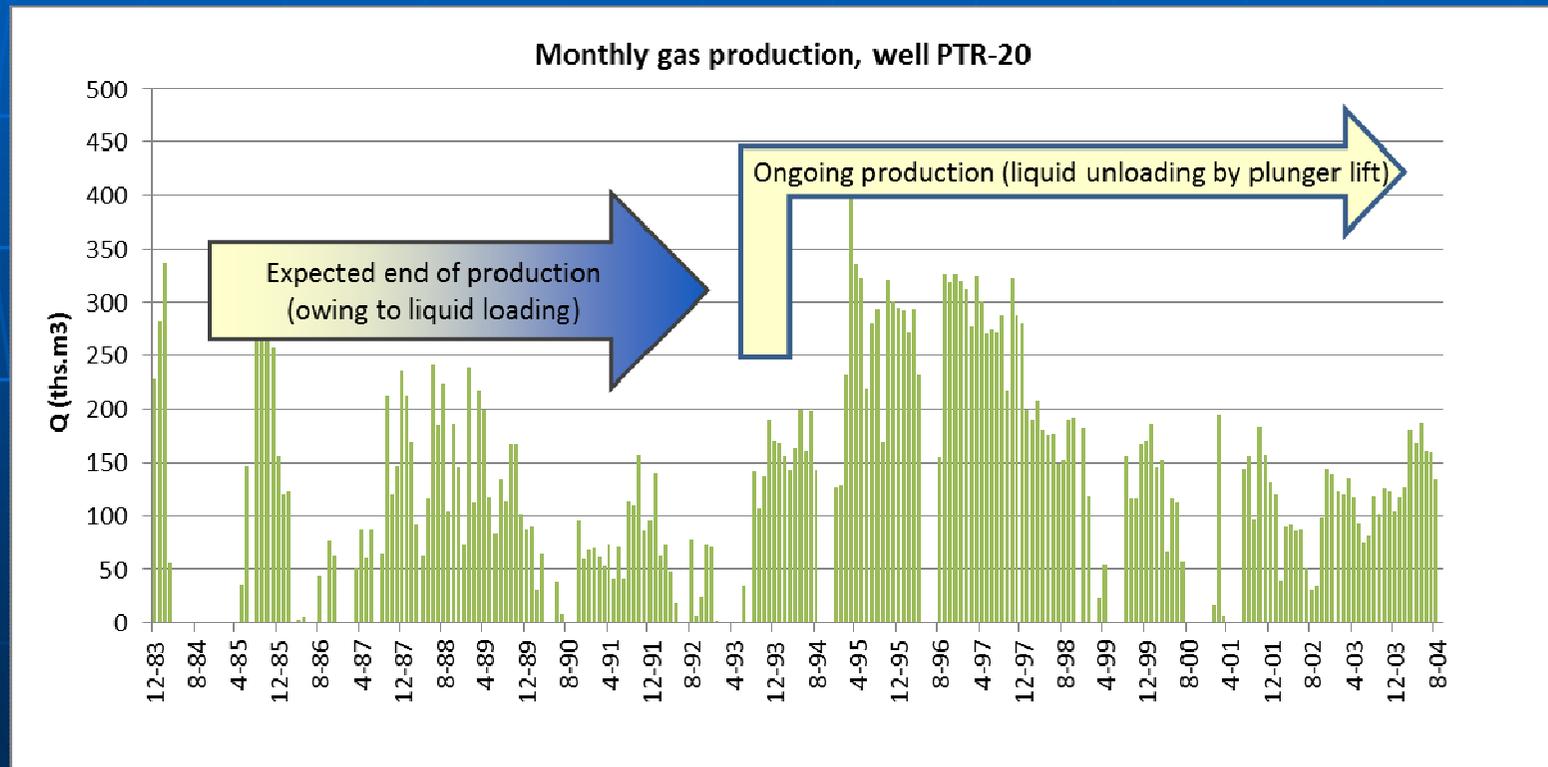
Well: *Ptrukša 20*

Depth of horizon: 1637,0-1763,0 m (3 intervals)

Liquid: salt water + gas condensate

Cumulative gas production: 29,6 MMm³

Gas production with plunger lift: 20,0 MMm³ (67,5 %)



Example of plunger lift efficiency:

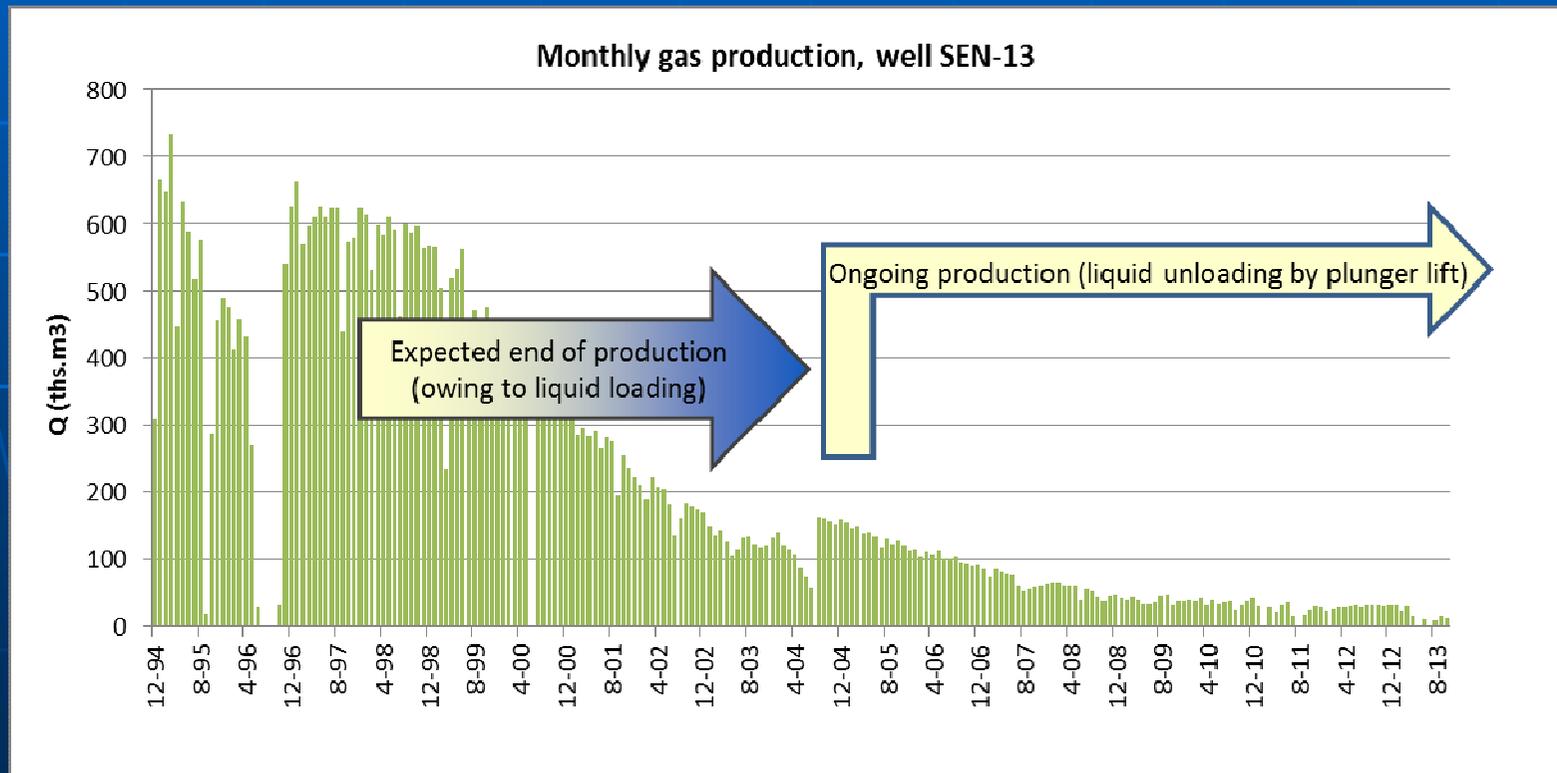
Well: Senné 13

Depth of horizon: 1916,0-1922,0 m

Liquid: salt water + gas condensate

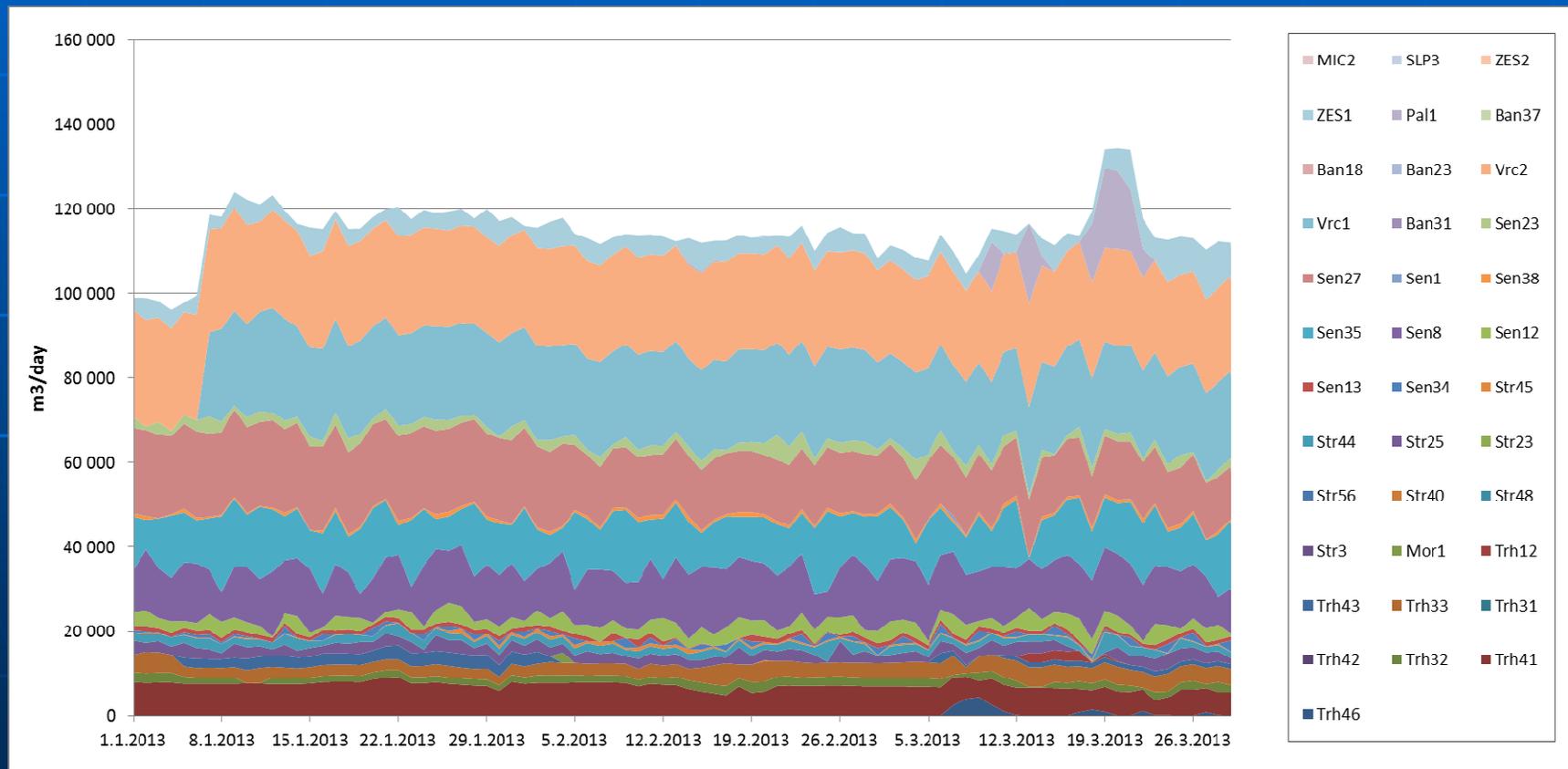
Cumulative gas production: 47,8 MMm³

Gas production with plunger lift: 6,8 MMm³ (14,2 %)



Example of daily gas production per wells – I.Q. of 2013

Delivery of gas to customers is based on the daily gas nomination
=> operative management of production for each well



Conclusions:

- *highest increasing of gas recovery is by compression of gas – average increasing is 30 %*
- *plunger lift utilization is very effective method for reaching of high recovery factor on liquid produced gas wells – increasing can be more than 50%*
- *detailed data acquisition and evaluation is very important for operative management and lifetime of gas wells and makes it possible to predict of gas production*

Thank you for your attention.