Activities for increasing of operation efficiency of the Incukalns Underground Gas Storage

(I. Scerbickis, A. Jesinska, E. Birgers JSC “Latvijas Gāze”)

Maģistrālo gāzesvadu shēma

Map of gas transmission pipelines

Схема магистральных газопроводов

- Pazemes gāzes krātuve
- Underground gas storage
- Подземное хранилище газа
- Gāzes kompresoru stacija
- Gas compression station
- Газовая компрессорная станц
- Gāzes mērīšanas stacija
- Gas metering station
- Газоизмерительная станция
- Jaunie gāzesvadi
- New gas pipelines
- Новые газопроводы

Main technical parameters of the gas storage facility

- Reservoir – sandstone located in the depth of 680 – 800 m, thickness (capacity) of formation 50 m
- Total gas storage volume 4.445 billion m^3, active gas 2.30 billion m^3 and cushion gas 2.145 billion m^3
- Design capacity – daily injection 12 million m^3, daily withdrawal 24 million m^3
- Working pressure– minimum 24 bars, maximum 105 bars
- Capacity of compressor stations – 33,5 MW (45 600 h.p)
- Number of wells – 187 (including 93 of production)
- Number of gas collection stations – 3
- Area of gas deposit ~ 20 km^2

History of the Incukalns UGS

- 1961 –start of exploration of geological structures that are suitable for natural gas storage
- 1964 – development of technological project of the gas storage facility by VNIIGAS (Moscow)
- 1965 – development of technical design of the gas storage facility made by GYPROSPECGAS (St. Petersburg)
- 1966 –start of construction of the facility
- 1968 – the first gas injection into the facility (16 mio m^3)
- 1969 – 1973 – the first stage of development (adjusting the main parameters for 1 billion m^3 of active gas)
- 1973 – 1985 – the second stage of development (2 billion m^3 of active gas)
- from 2001 – the third stage of development (upgrading)

Investments in development of IUGS

1 LVL = 1,43 EURO

Reconstruction of compressor station No. 1

- Before reconstruction
  - Compressor Station built in 1967
  - Installed 13 units 10 GKNA
  - Injection capacity 7 mio. m^3/24 hours
  - Gas consumption for running of the engines 1,5% of injection volume
  - Oil consumption about 150 t/season
- After reconstruction
  - Reconstruction was finished in 2007
  - Installed 1 unit
  - Injection capacity 5 mio. m^3/24 hours
  - Gas consumption for running of the engine 1,3% of injection volume
  - Oil consumption 3,5 t/season

Reconstruction of Gas Collection Station No.1

- Before reconstruction
  - Gas Collection Station was built in 1967
  - 20 wells by 12 technological lines were connected to the Station
  - One stage for purification of gas
  - Manual operation

- After reconstruction
  - Reconstruction will be finished in the end of 2008
  - 20 wells by 16 technological lines are connected to the to Station
  - Two stages for gas purification ($3 * 10^{-6}$ m)
  - Full automation of technological processes
  - Special line for tests of wells

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Reconstruction of the Electric Power System

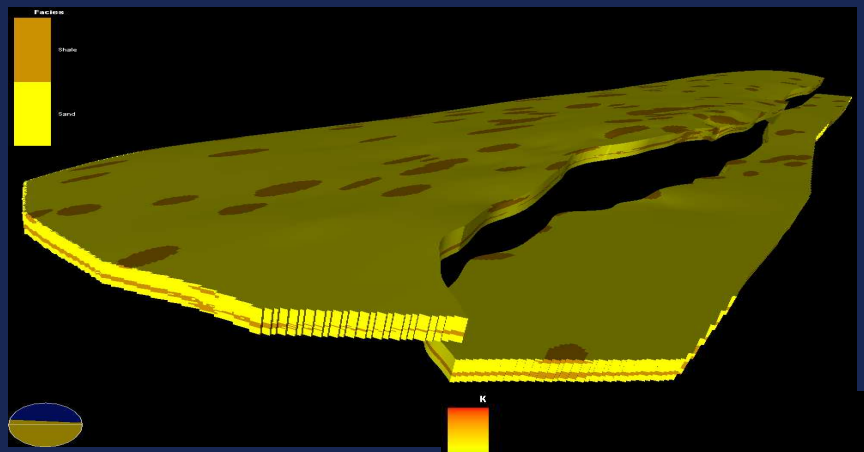
- Special purpose of reconstruction was:
  - change of outdated equipment
  - conversion from 3 stages voltage system to 2 stages voltage system
  - 2 independent electrical lines for the Storage
  - installation of backup electric power units
  - creation of automatic operation system for electric power system
- Reconstruction was finished in 2006

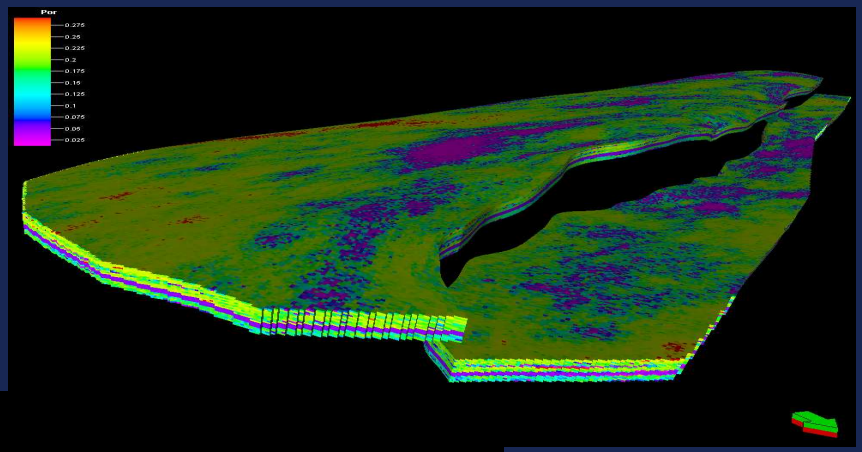

13
12
SP-12
13

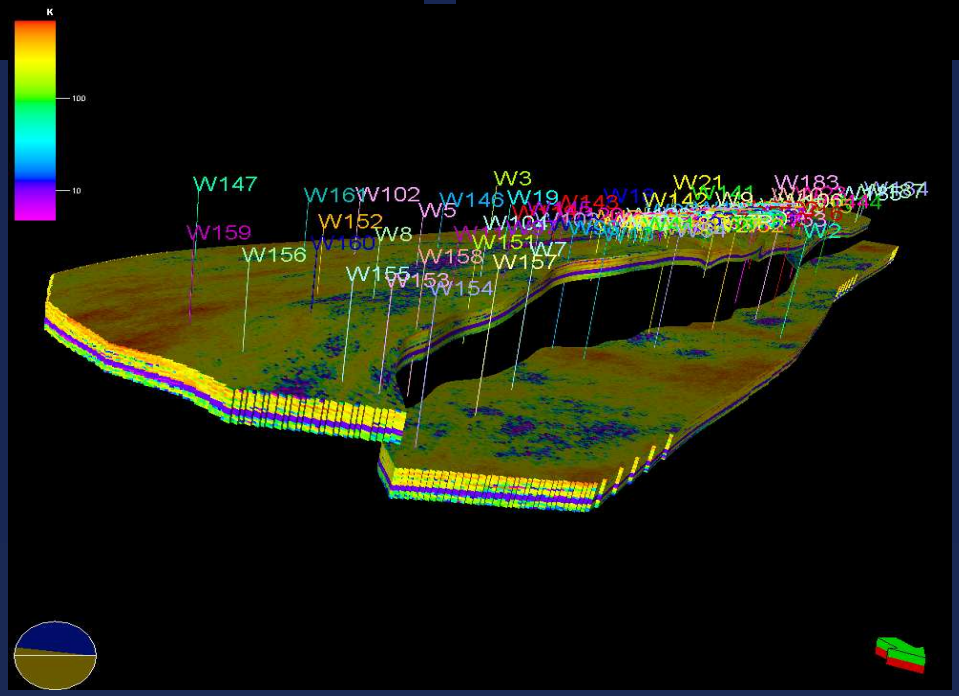
Reconstruction of Electrochemical Protection System Against Corrosion

- Special purpose of reconstruction was:
  - change of outdated equipment
  - optimization of system operation
  - add to system 30 observation wells
  - creation of system of telemechanics for electrochemical protection system

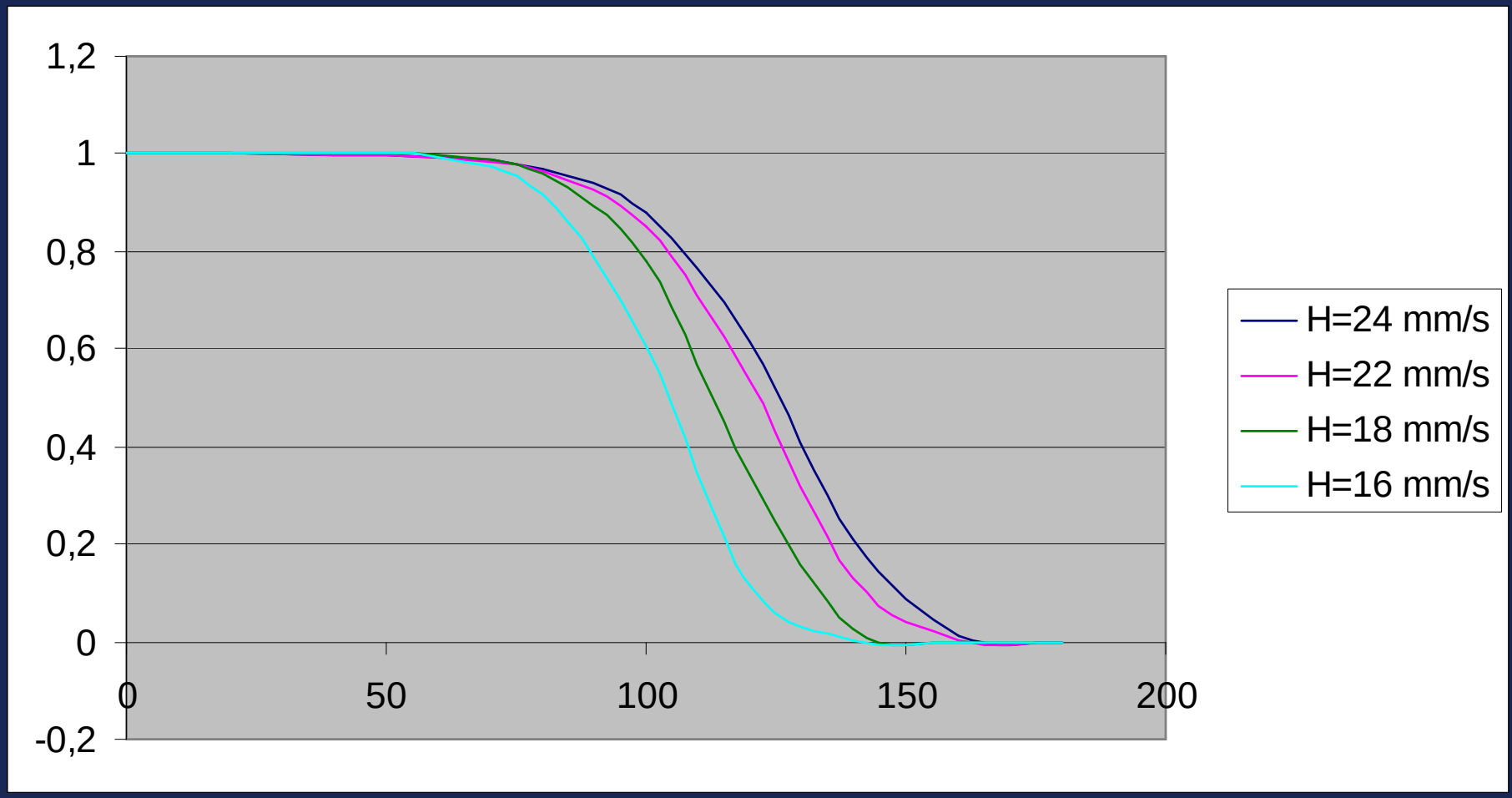
Geological 3 Dimensional Model



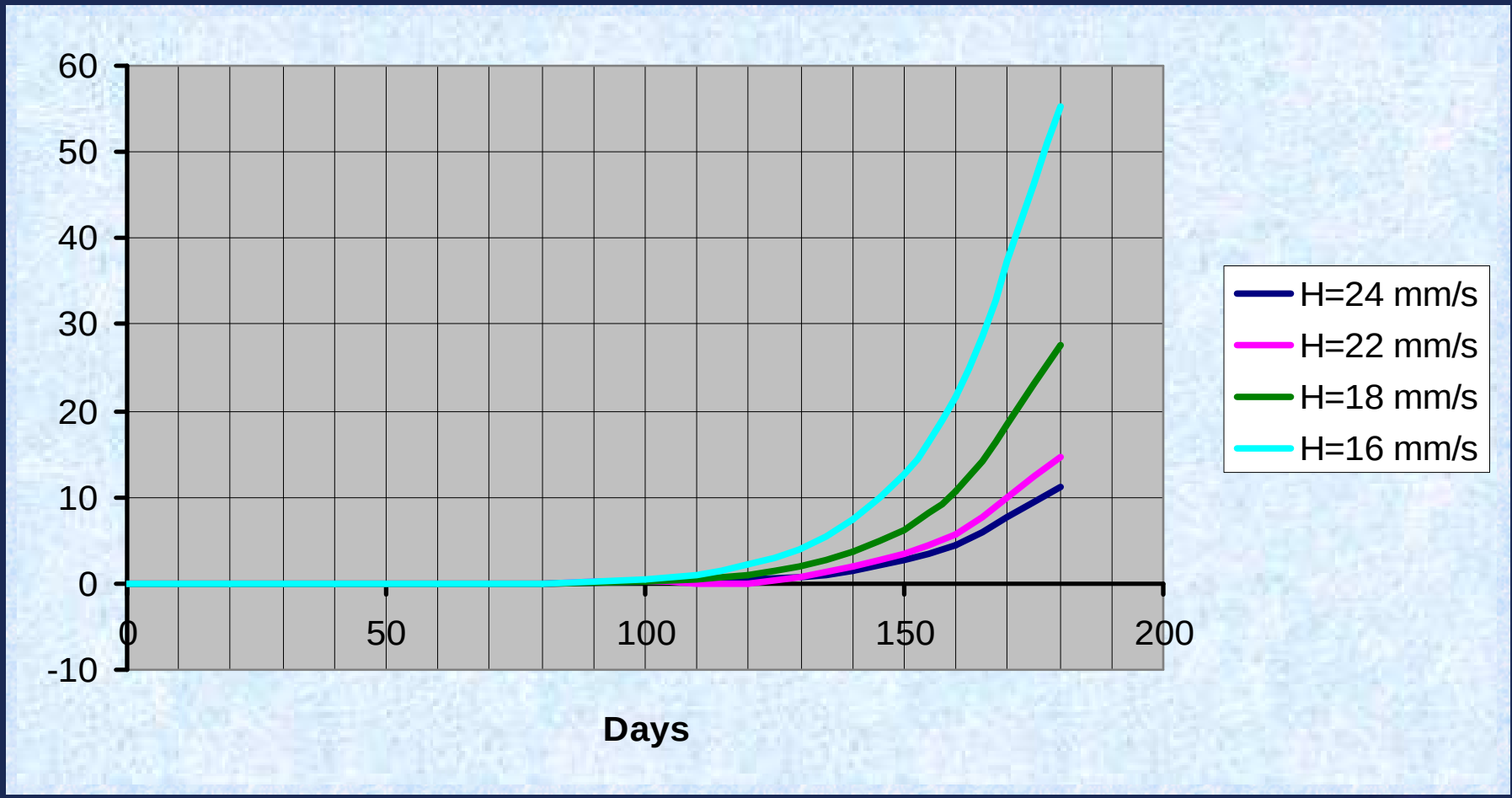




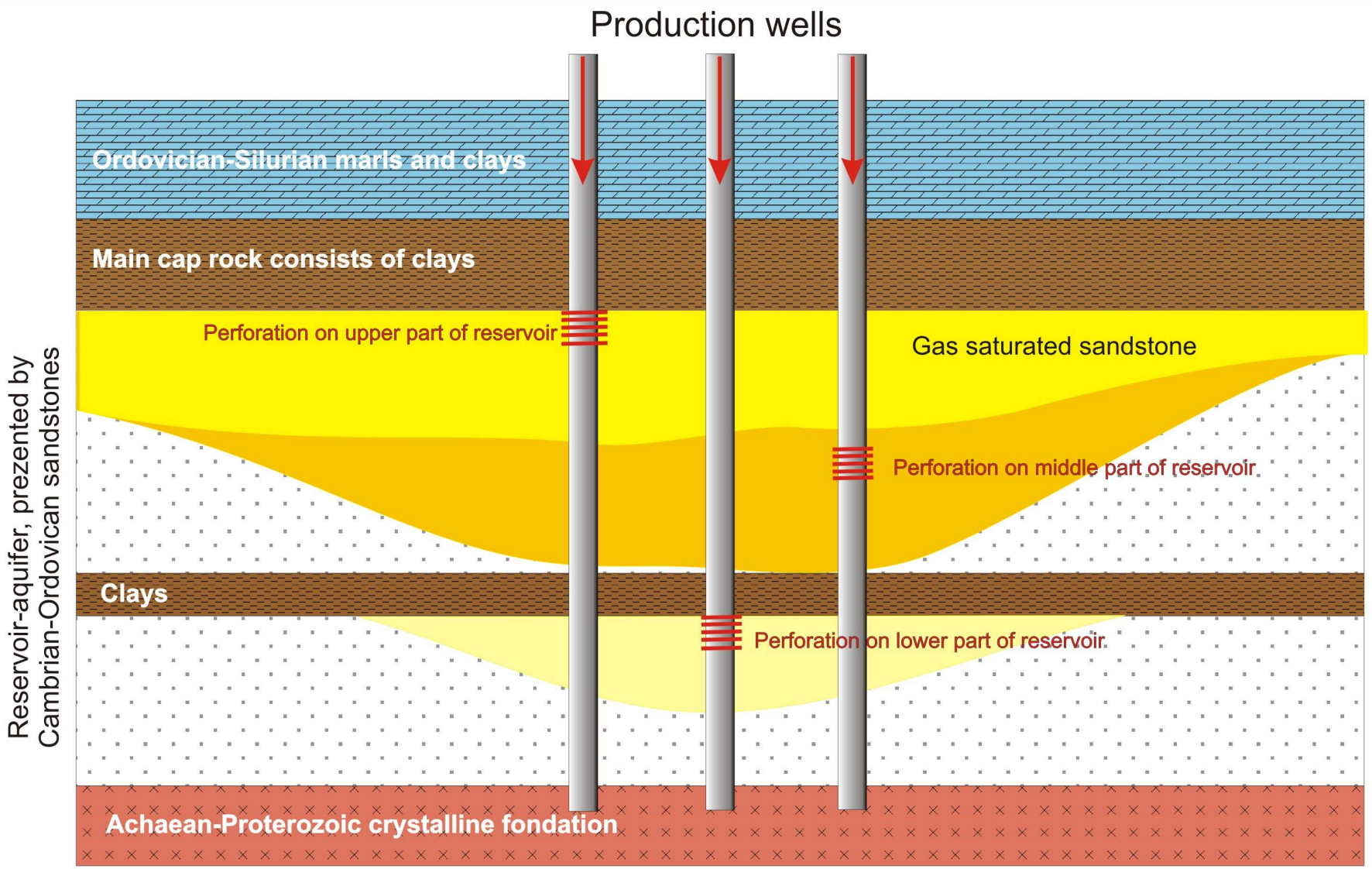
Assessment of duration of operation of the Compressor Station without interruption (days)



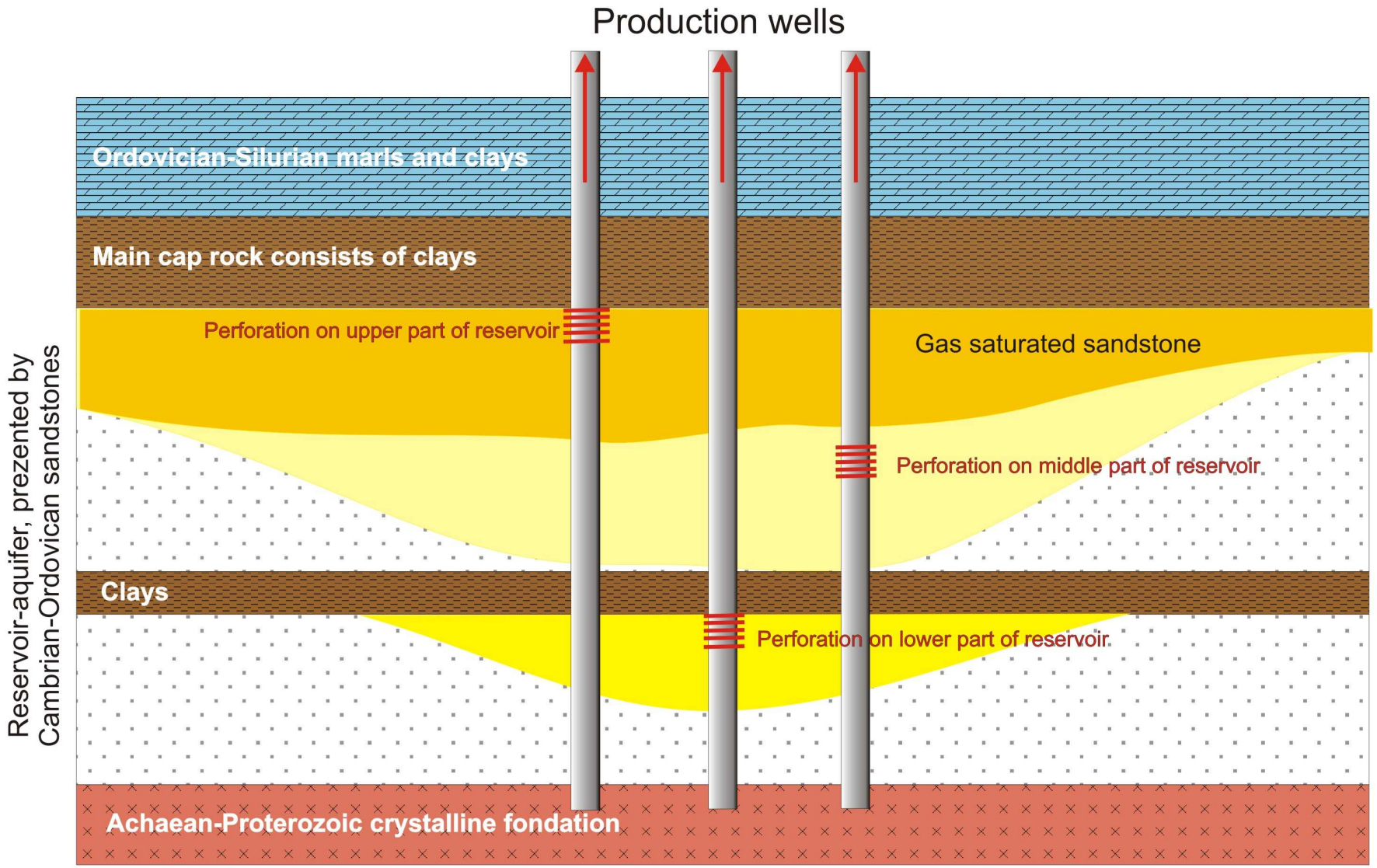
Dependence of number of stops of the Gas Pumping Units in the Compressor station No. 2 from the permissible vibration level



Scheme of selective operation of Incukalns UGS reservoir (injection)



Scheme of selective operation of Incukalns UGS reservoir (withdrawal)



Conclusions

1. The gas supply system of Latvia is part of a unified system, which supplies gas to Latvia, Estonia, Lithuania, the North of Belarus and the North–West of Russia
2. In order to secure effective and safe operation of the UGS it is very important to pay great attention to both: geological and technological issues
3. IUGS has outstanding properties and technical characteristics. It is friendly to environment, therefore it has earned ISO 14 000 certificate, and for high labour safety standards it is awarded with OHSAS 18 000 certificate
4. Gas volume stored in IUGS could be increased to 6.2 billion m^3 without major capital investments

Thank you for attention!