Groundwater protection and drinking-water supply in the federal province of Burgenland (Austria)

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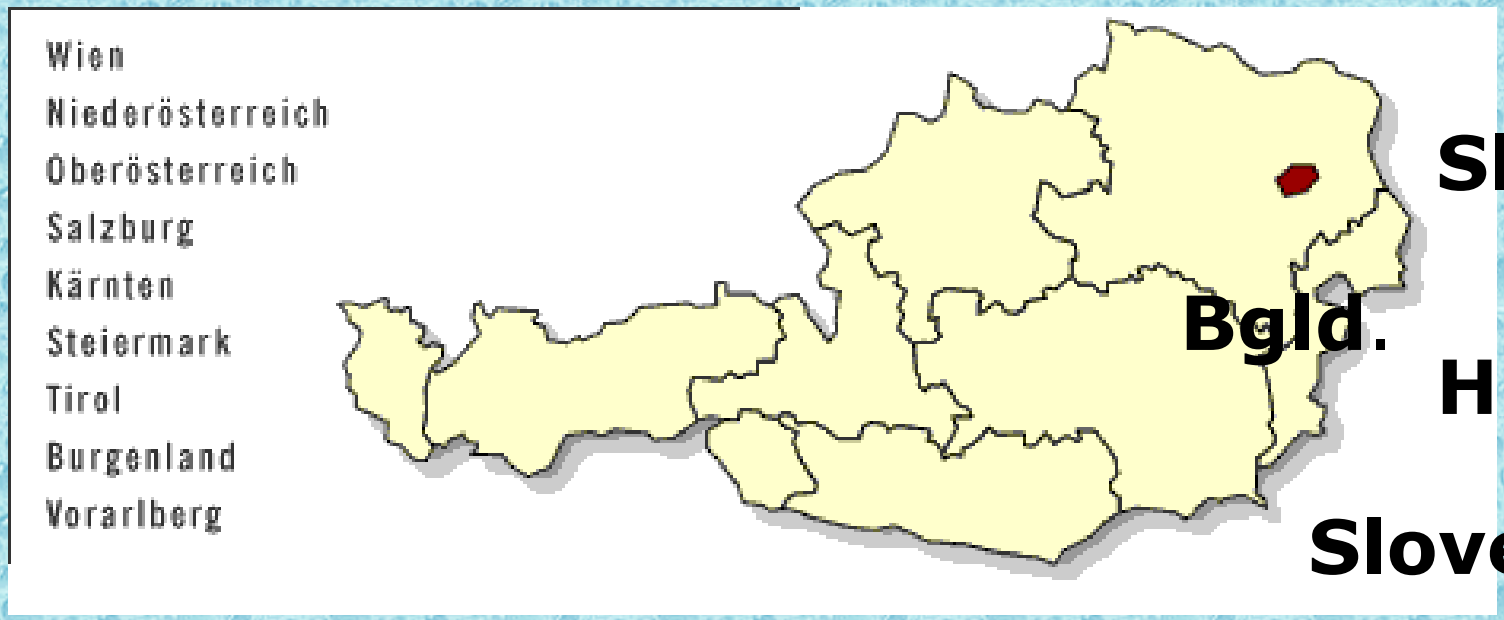
Burgenland


Wien
Niederösterreich
Oberösterreich
Salzburg
Kärnten
Steiermark
Tirol
Burgenland
Vorarlberg
Bgld.
Slovakia
Hungary
Slovenia

Burgenland – characteristic data

- location in the east of Austria
- area 3966 km²
- population 270.000
- state-borderline 397 km
  (Hungary, Slowakia, Slowenia)

climate

- continental-pannonian climate
- extreme differences between summer and winter temperatures
- mean precipitation rates about 710 mm
- high evaporation rates

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relatively low groundwater regeneration rates

Hydrogeology and drinking-water supply

- **drinking-water supply:**

  100% groundwater

  85 % groundwater from porous aquifers

  15 % springs

  groundwater sources:

- **shallow quarternary groundwater aquifers**

  (e.g. Seewinkel, Parndorfer Platte, Wulkatal ....)
- **springs (Leitha-, Günser-, Rosalia- Gebirge ....)**
- **deep groundwaters**

  (often artesian groundwaters in tertiary basins;

  especially important in the southern and middle part of Burgenland)

Development of drinking-water supply

- **Until the fifties of the 20th century:**
  mainly private wells
  some village water-supplying systems
- **Today:**
  88 % larger water associations
  11 % village water-supplying systems
  1 % private wells

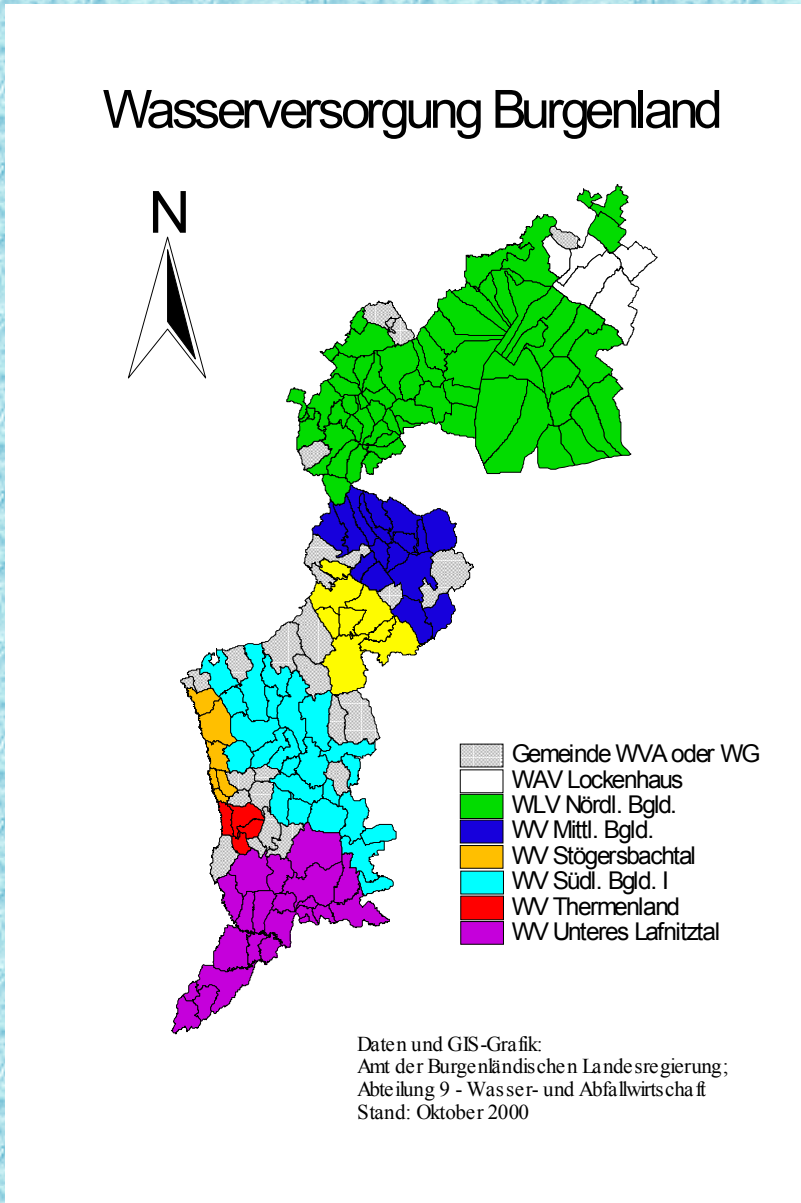
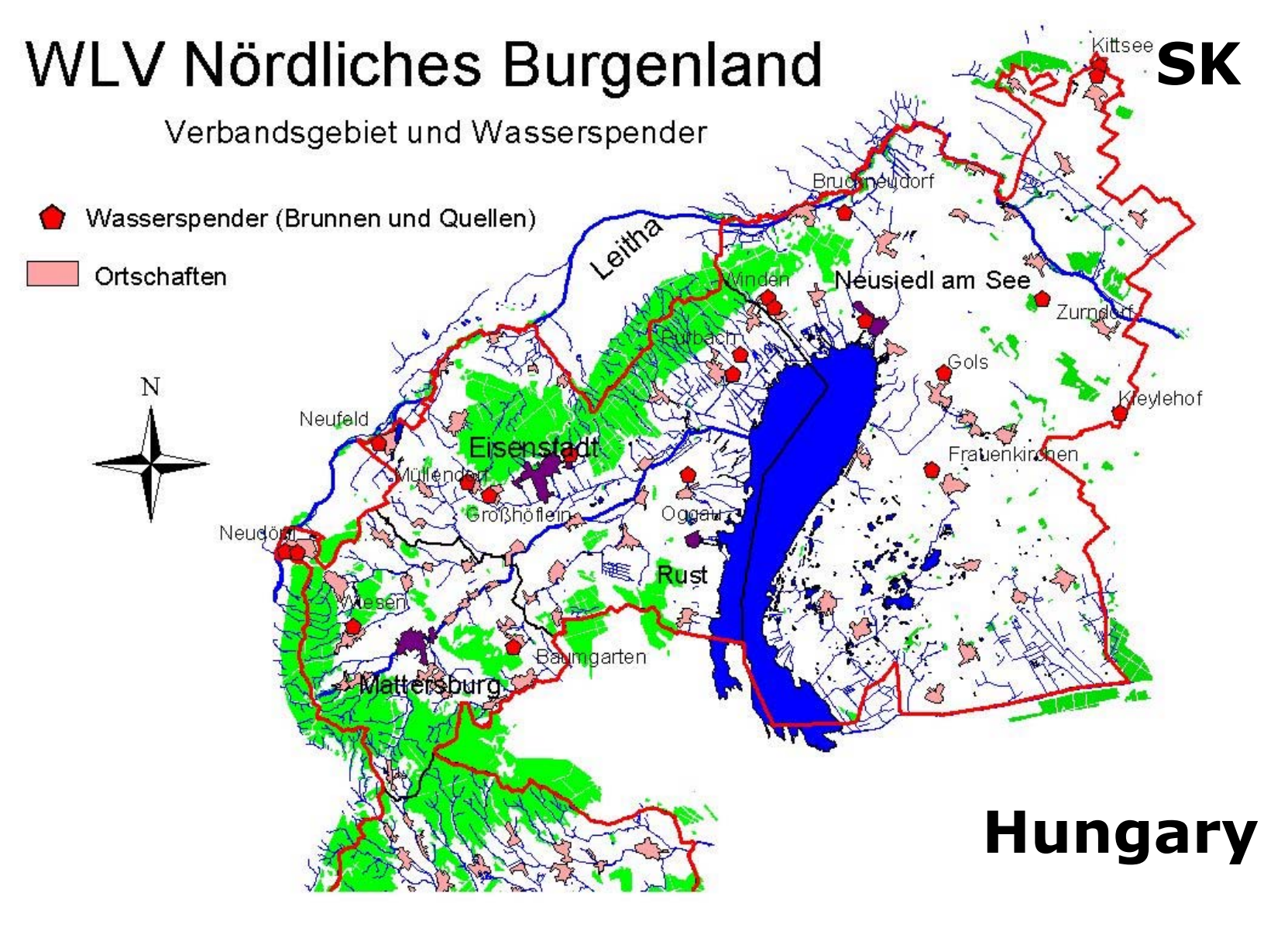


Figure 1: water supply Burgenland


WLV Nördliches Burgenland
Verbandsgebiet und Wasserspender
Wasserspender (Brunnen und Quellen)
Ortschaften
N
SK
Hungary
Kittsee
Bruckneudorf
Leitha
Winden
Neusiedl am See
Zurndorf
Purbach
Gols
Kleylehof
Frauenkirchen
Neufeld
Eisenstadt
Müllendorf
Großhöflein
Oggau
Neudörfl
Rust
Wiesen
Baumgarten
Mattersburg

groundwater hazards

- **Qualitative hazards**

  local scale

  industry, transport and handling with dangerous goods, contaminated sites ....

  regional scale

  agricultural use (nitrate, pesticides)...

  transboundary scale

  airborne pollutants...

- **Quantitative hazards**

  overexploitation, sealing of soils.....

Legal basis for the protection of groundwaters

- **Federal Act on Water Law (WRG, 1959)**

  groundwater = drinking water

  → **groundwater protection zones**

  (prescribed as decree)

  groundwater prevention areas

  (issued as ordinance)

- **Federal Act on Hydrography**

  → **water quality monitoring system**

  (120 gw. samples 4 times per year)

Technical basis for delimitation and prescription of measures

Directive W 72 (ÖVGW, 1995:„Schutz-, und Schongebiete"):

3 protection zones are basis for groundwater protection zones and groundwater prevention areas:

zone I: local protection of a single well or spring

zone II: protection against bacteriological contamination (60 day-zone)

zone III: part of the catchment area or whole catchment area

measures: prohbitions, orders, requirement of permissions, requirement of announcement of activities

Burgenland:

- 9 groundwater prevention areas are issued (they cover more than 120 km²)
- 5 groundwater prevention areas are in preparation

A lot of small groundwater protection zones are prescribed (statistical data yet not available)

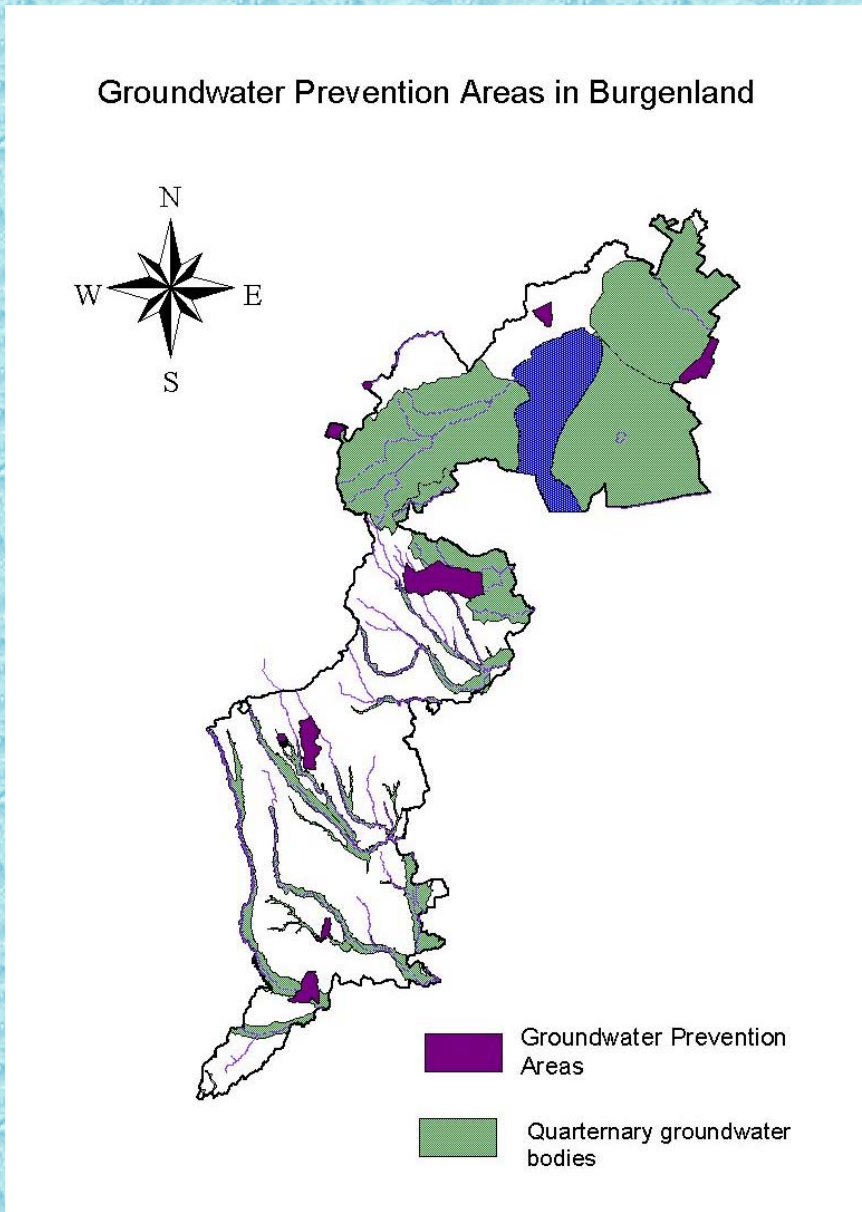


Figure 3: Groundwater Prevention Areas

agricultural use and groundwater protection

- **Austrian Environmental Program for Agricultural Use** (named ÖPUL in German)
- **regional groundwater projects** (based on ÖPUL)
- **agricultural advising projects** (groundwater 2000)

Problems in some quarternary gw.-bodies:

There are not too high nitrogen deposits per square units, but nitrate problems are caused by low groundwater regeneration rates

Important measures concerning agricultural use

- **appropriate use of fertilizers**

(demanding on the needs of the plants)

- **soil cover with plants in wintertime**

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minimum of nitrate percolation into the groundwater

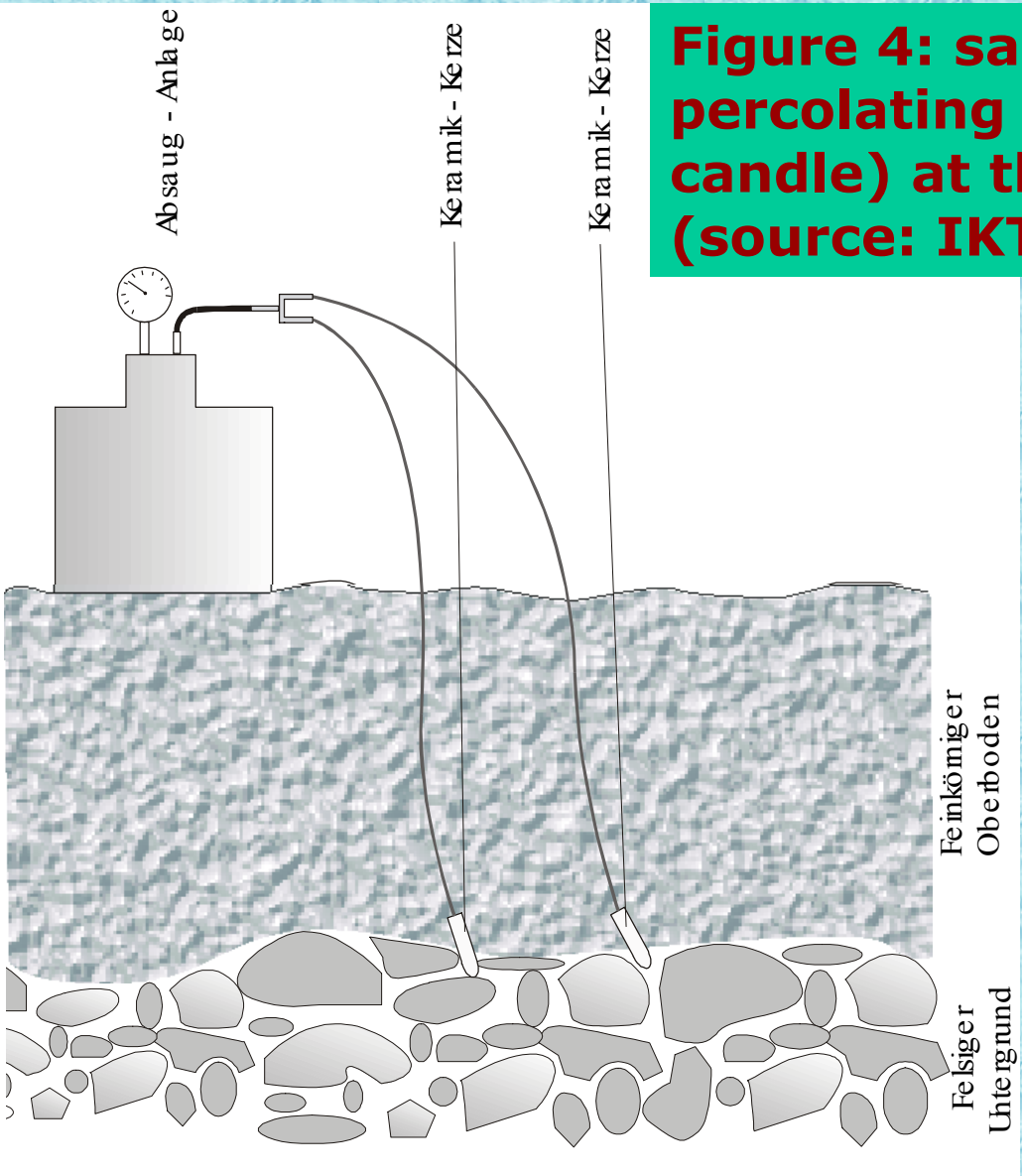


Figure 4: sampling station for percolating water (suction candle) at the Leithagebirge (source: IKT, Petzenkirchen)

Protection of deep groundwaters

Deep groundwaters are:

- **protected by overlaying thick layers of widely unpermeable sediments**
- **old and have a good quality**
- **limited in quantity**

Overexploitation may lead to a **decline of the groundwater hydraulic head** and **qualitative problems** (e.g. intrusion of underlaying higher mineralized waters)

Knowledge about quantity and renewal is **uncomplete**

water authority in Burgenland prescribes:

appropriate measuring systems for the continuous quantitativ observation of deep wells with

- continuous measuring of hydraulic head (with precise pressure sensors)
- continuous measuring of groundwater abstraction rates (with IDM flowmeter)
- data storing with electronic systems

the aim is the sustainable use of deep groundwaters

Figure 5: results of a pumping test (Heiligenkreuz)

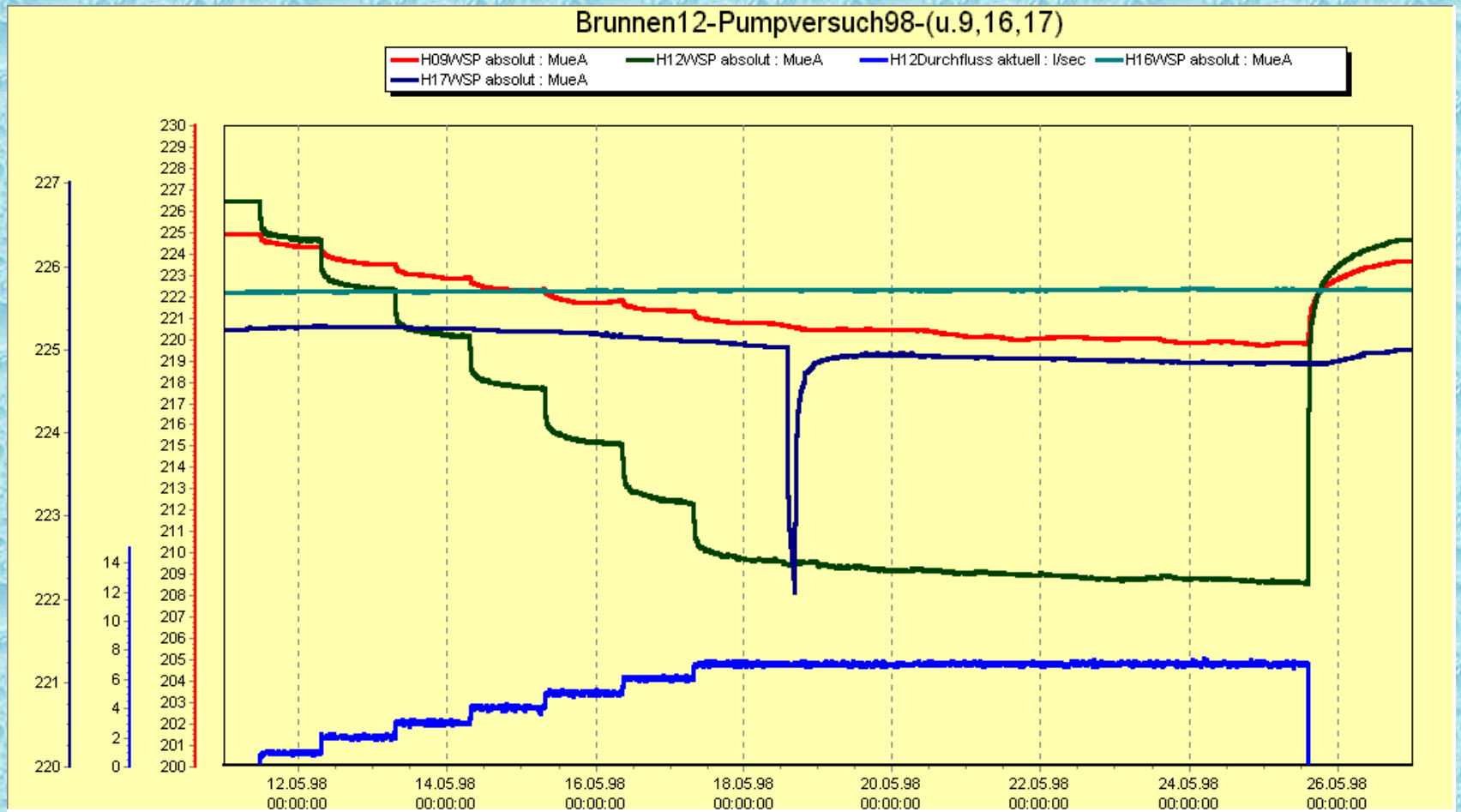


Figure 6: isolines of hydraulic head of deep groundwaters (Heiligenkreuz)

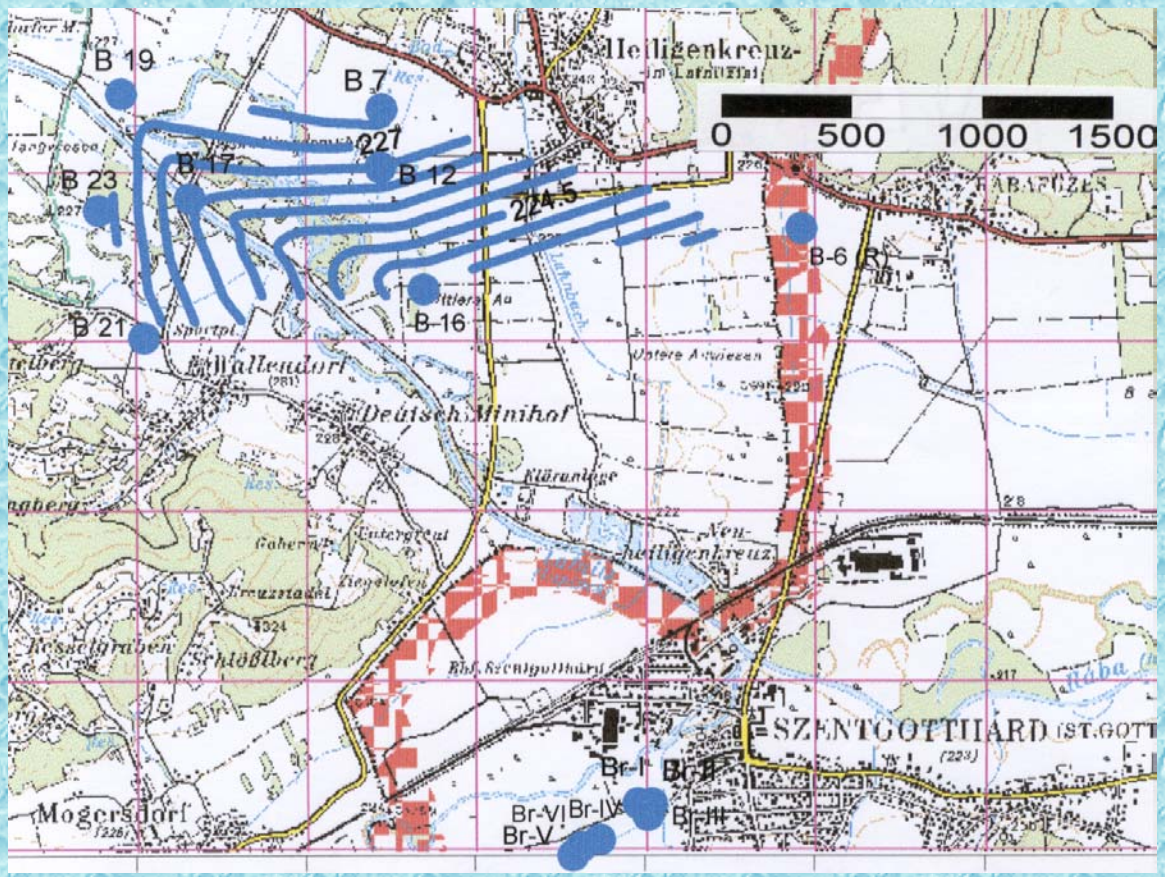
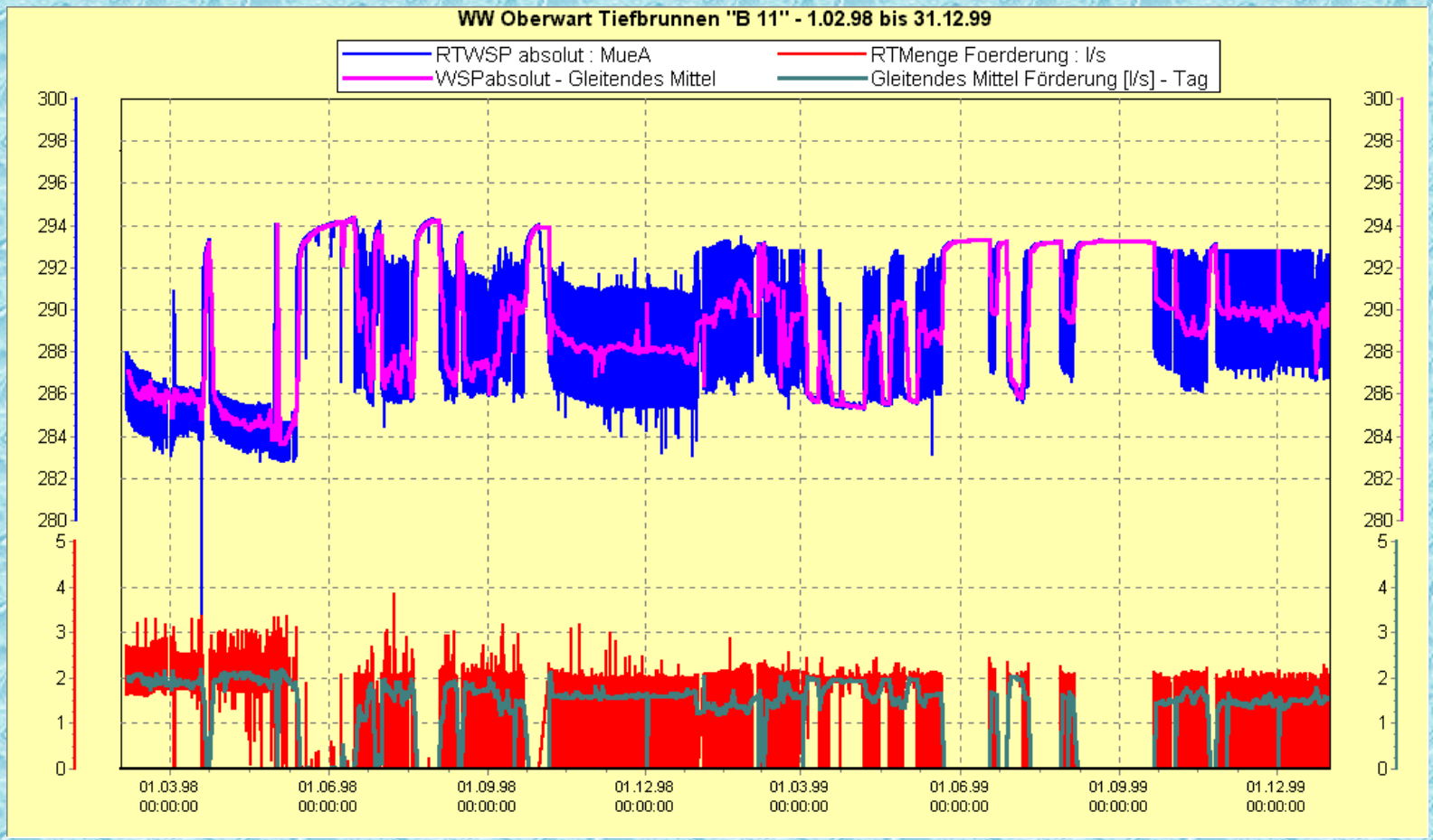


Figure 7: results of the long term observation of a deep well (Oberwart)



Summary:

- drinking-water in Burgenland is of good quality and the quantity is sufficient
- The good infrastructure ensures in combination with the providing groundwater protection measures a quantitativ and qualitativ unobjectionable drinking-water supply at the present and in the future
- The sustainable use of groundwater is the aim of the water management at the present and in the future