# 7. CONCLUSIONS REGARDING THE INVESTIGATION AREA

## 7.1. UNDERGROUND CONNECTIONS IN DEPENDENCY TO HYDROGEOLOGICAL CONDITIONS (J. JANEŽ)

Geological cross-section 1-1' (Fig. 7.1) shows the structure, that makes the underground water flow from the western and middle part of Trnovski Gozd to the West, to the springs near the Soča river, possible. The whole area is part of the Trnovo nappe, where the Uppertriassic, Jurassic and Cretaceous carbonate rocks dip towards South-west. There is no hydrogeological barrier between Belo Brezno and the Soča valley. The Uppertriassic dolomite is found in the basis of karstified Mesozoic limestone. The dyeing in Belo Brezno likewise the older tracing test in Čepovan shows that the regional faults (Avče fault, Raša fault) do not influence the general direction of the karst groundwater flow. The horizontal distance between Belo Brezno and the Mrzlek spring is 21 km, and the altitude difference is 970 m.

The position of Uppertriassic and Jurassic beds, that dip towards Southwest enables the groundwater outflow from Belo Brezno to Hubelj. Uppertriassic dolomite is relative hydrogeologic barrier in the grounding of Jurassic limestone. By drawing the lifting of the flysch beds in the nearest hinterland of Hubelj at the Avče fault we try to show that interrupted and periodical appearance of the tracer in the Hubelj spring can be a consequence of the hydrogeological structure, too (Fig. 7.2).

Cross-section 3 - 3' (Fig. 7.3) shows geologic and hydrogeologic conditions between the Vipava spring, injection points Malo Polje and Mrzli Log and the spring Divje Jezero near Idrija. At Malo Polje the dye was injected into the Jurassic limestone. Under the Uppertriassic dolomite of the Trnovo nappe and Čekovnik interjacent slice the dye flowed off towards Divje Jezero. The horizontal distance is 10,0 km and the altitude difference 295 m. Considering the geological conditions it can be expected that Malo Polje also belongs to the catchment area of the Hubelj spring although the tracing test did not confirm that supposition.

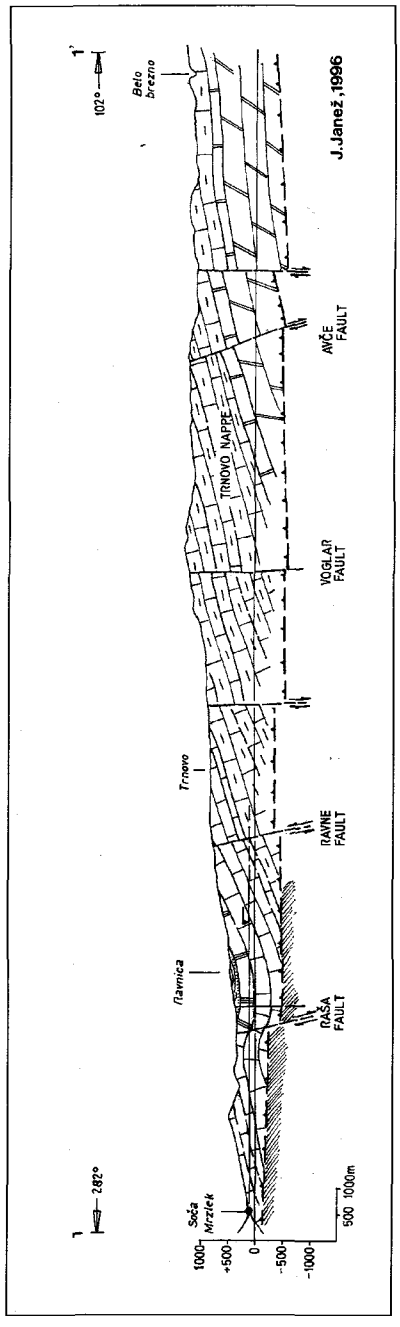


*Fig. 7.1: Geological cross-section 1-1'; Belo Brezno - Mrzlek.*

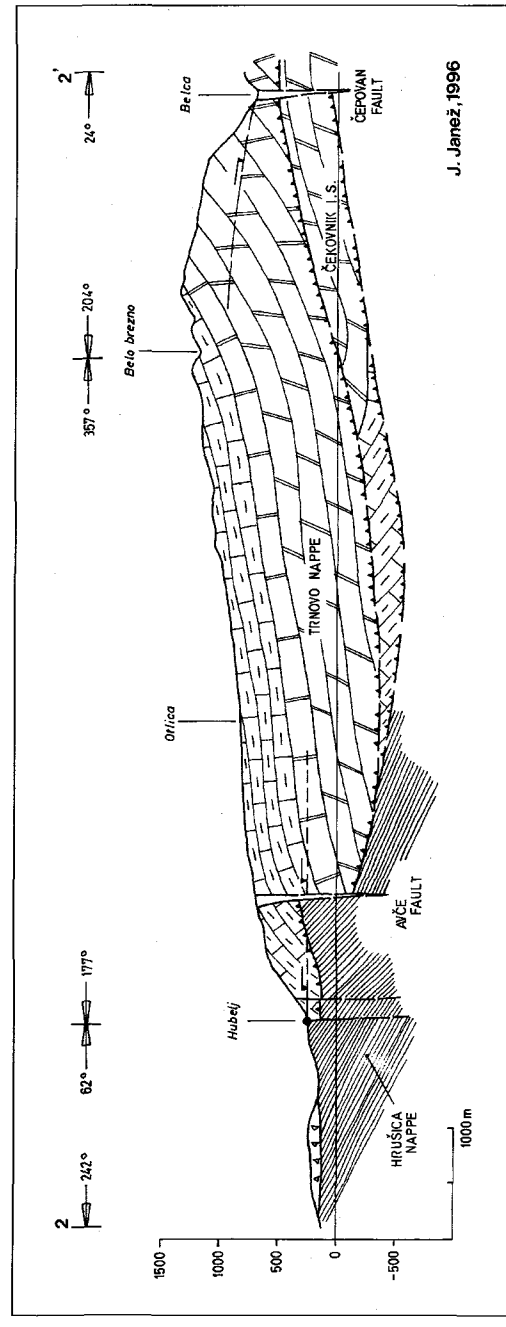


*Fig. 7.2: Geological cross-section 2-2'; Belo Brezno - Hubelj.*

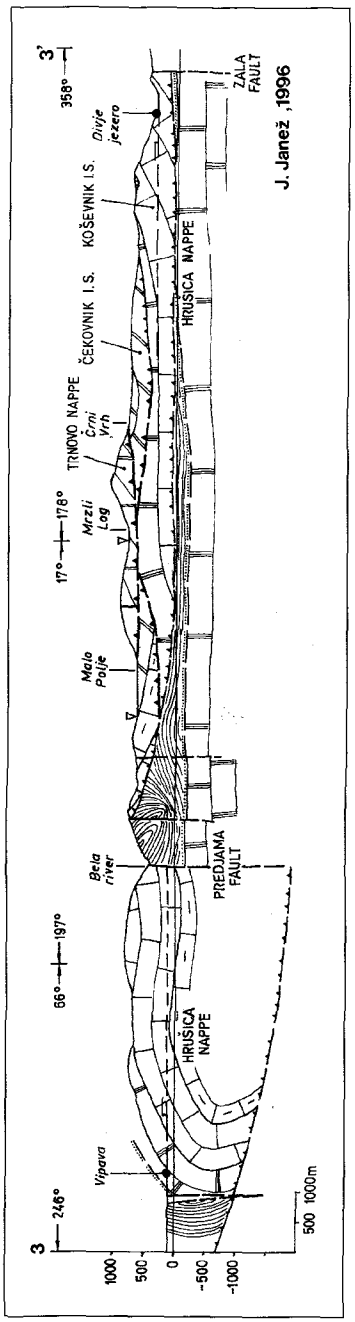


*Fig. 7.3: Geological cross-section 3 - 3'; Vipava-Malo Polje-Mrzli Log-Divje Jezero.*

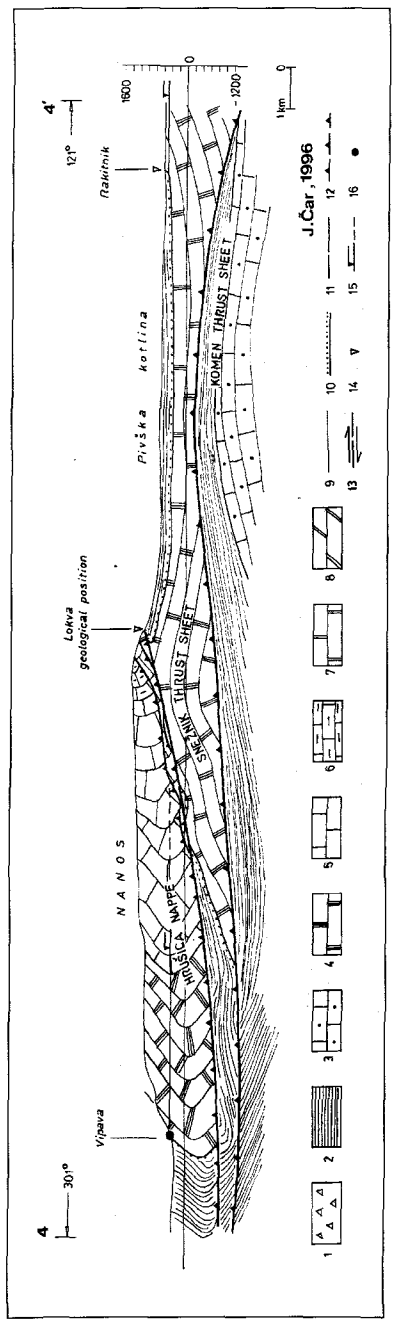


*Fig. 7.4: Geological cross-section 4 - 4'; Rakitnik-Lokva-Vipava.*

*LEGEND 1- Periglacial breccia and rubble, Quaternary and Holocene; 2- Flysch rocks of Upper Cretaceous, Palaeocene and Eocene age; 3 - Limestone, Palaeocene; 4 - Upper Cretaceous organogenic limestone; 5 - Lower Cretaceous bituminous limestone with inliers o f dolomite; 6 - Limestone and dolomites of Jurassic age; 7 - Norian - Rhaetian (Dachstein) limestone; 8 - Norian - Rhaetian dolomite; 9 - Normal geological boundary; 10 - Erosion discordance; 11- Fault; 12 - Thrust; 13 - Direction of tectonic movement; 14 - Sinkhole, Injection point; 15 - Groundwater level; 16 - Karst spring.*

Much more difficult is to explain the underground connection between Mrzli Log and Divje Jezero. The dye was injected in the sinkhole formed in the Uppertriassic dolomite of Trnovo nappe. As in the Čekovnik interjacent slice near Črni Vrh a hanging fissured aquifer is proved by a hydrogeological borehole it can be supposed that the dye gets lost through the shallow dolomite lid into the lower limestone of Koševnik interjacent slice, where a normal karstic flow towards Divje Jezero is possible. The horizontal distance between Mrzli Log and Divje Jezero is 7,2 km, while the altitude difference is 455 m.

This geological cross-section (Fig. 7.4) explains the hinterland of the Vipava spring. P. Habič (1989) proved that the sinking stream Stržen near Rakitnik in the Postojna basin flows away in two directions, towards the Timava springs as towards the Vipava. The cross-section shows that the Lokva can have a normal underground karst flow towards the Vipava spring without any hydrogeological barrier. It has to be pointed that Lokva at low water can flow of into the limestone of Snežnik thrust sheet and trough it towards Timava. Although this geological cross-section is only supposed, it gives an explanation for the phenomenon, that the dye injected at low water in the Lokva stream did not appear in the Vipava spring.

## 7.2. UNDERGROUND WATER CONNECTIONS DEPENDENT ON HYDROMETEOROLOGICAL CONDITIONS (P. HABIČ)

### 7.2.1. The aim of water tracing by artificial tracers

From 1993 to 1995 combined water tracing tests in the area of Trnovski Gozd and Nanos were achieved mostly at the same points but during various meteorological and hydrological conditions. Using mostly the same tracers provided that tracing results may be well compared one to another. Except in two cases, the tracers were poured into epikarst vadose zone, this is why their travel up to springs highly depended on rainfall, in particular on consecutive showers that washed the tracer from the injection area. The analyses of water and tracer pulses in such cases are specially interesting.

The results of three consecutive water tracing tests in Belo Brezno below Golaki are important to understand water drainage in the area of Trnovski Gozd. Major part of tracer from the injection point at 1200 m a.s.l was flushed by rainwater into Mrzlek near the Soča (77 m a.s.l.), distant 19 km and partly into Lijak (water level between 77 and 116 m); smaller part flowed into near, 6,9 km distant Hubelj spring near Ajdovščina (water level between 220 to 270 m; See Chapter 6 about water tracing). Water tracing in immediate recharge