

CATASTROPHIC FLOODING OF WAPNO SALT MINE (1977) AND CONTROLLED FLOODING OF SOLNO MINE (1986-1991) - REASONS, CIRCUMSTANCES, CONSEQUENCES

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Abstract:

Both mines were located in salt domes of North-Western Poland, and in both of them over 50 years of intensive mining activity had place.

Wapno mine had 5.3 millions m³ of empty headings and excavations made using classic dry exploitation methods just underneath the Wapno town with 10 thousands of citizens.

Solno mine had 15.6 millions m³ of empty headings and chambers made by solutioning methods just underneath the Inowroclaw town with 80 thousands of citizens.

Wapno mine was catastrophically flooded in August 1977 by abrupt inflow of water into the upper chambers. The flooding was precluded by the brine inflow slowly growing up during several years. The main cause of the catastrophe was erroneous exploitation of the mine upper level which weakened the upper shelf stability. The quick water inrush into the mine created the suffosion of sands over the caprock and significant damages on the surface, forming several sinkholes and wide subsiding trough in the town. Over 1400 people were evacuated and nearly all buildings in the old center of town were destroyed or seriously damaged, but no one was injured.

In the paper the reasons of the catastrophe, and its consequences are presented using photographs and maps.

The Solno mine controlled flooding was specially designed to avoid such a catastrophe in the future in Inowroclaw. After several analyses, the flooding technology was chosen based on following assumptions :

- empty spaces will be filled using nearly saturated brine,
- all brine for Solno flooding will be produced by Solno mine itself,
- as a leaching medium, the waste soda lye from nearby soda factory will be used.

The flooding process started in 1986 and was finished in 1991. Surface subsidence almost disappeared, there was no sinkholes, and no impact on the shallow underground water quality. Inowroclaw town recovered important area in the center for further development.

In the paper the circumstances and the results of the controlled flooding of Solno mine are presented.

Key words: Poland, Rock Salt Mining (Shaft), Salt Mine Flooding, Salt Domes, Mechanical Integrity, Sinkholes, Subsidence.