

Salt Mine Stability Investigation at Witton Bank, Pennys Lane, and Neumans Mines, Northwich, and at Marston near Northwich, Cheshire

Client: Vale Royal Borough Council
Engineer: High Point Rendell - Geotechnics
Value: £255k
Date: 1995 - 1996

Description of Works:

The investigations were carried out to provide information on the possible life expectancy/time to collapse of flooded open salt mine workings in the Cheshire "Bottom Salt".

The work consisted of:

- Drilling 12 rotary boreholes to depths of up to 100m below ground level using rotary open hole drilling with coring to some sections of boreholes
- Borehole logging, sampling and logging of cores
- Drilling was carried out using a Brine/air mist flush re-circulation system, with brine supplied from a site tanker unit (brine was supplied from British Salt)
- Wellhead 'blow out' preventers were used on all boreholes during drilling to prevent potential brine blow out caused by release of trapped air in the mines
- A critical aspect of the work was to case off the upper salt "wet rock head" to ensure there could be no penetration of natural groundwater into the lower mine which could cause further salt erosion and would also cause changes to the static hydraulic head in the mine
- This was ensured by use of Casagrande Dual Head Drilling Rigs allowing one pass simultaneous casing of the drill hole and sealing this 200mm dia primary casing into the upper salt. Drilling was then progressed with a smaller 139mm dia drilling/casing system to the bottom salt workings
- Our dual head rigs have sophisticated cuttings collection systems which ensure all drill flush returns are collected and returned to settlement facilities. This was a particularly important and useful feature for the contract to prevent any brine spillage
- The dual head system with the installed cuttings collection units was easily modified to include a blow out prevention facility

A number of down hole surveys were also undertaken as part of the works, including:

- Salinity monitoring using electrical conductivity meter
- Boreholes vertically testing
- Ultrasonic surveys of mine cavities carried out by Cavity Surveys Ltd
- High pressure dilatometer testing
- Pumping tests and variable head permeability tests
- Installation of magnetic extensometers.
- Installation of standpipes



In addition to the above, probe drilling to locate 11No. mineshfts and brine pits were carried out using rotary percussive probe drilling.

Laboratory testing of groundwater and rock cores was also carried out and a completion report prepared.