

# Spatial and Temporal Changes of Physio-Chemistry Aspects of Mine Water, Due to Post-Closure Water Management

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## Abstract

Over time and spatially, in dynamic mine systems, the water changes naturally and due to alterations in water management. Understanding the behaviour of water within the mine system, along with how this water changes can be essential. Understanding of the mine system and the water can help with future predictions, and result in most beneficial management options being used.

Part of mine water management includes inspections of the mine shafts; discrete sampling; and electrical conductivity logging of the water in the shafts. These tests are used to confirm or improve the conceptual understanding of the mine system, and often used in mine water prediction and water management planning.

The project focussed on the Dawdon-Horden Coalfield, in northeast England. Shaft logging discrete samples have been taken between 2000 and 2019, from 4 mine shafts. Mine water levels were monitored since 1990s to predict mine water rebound risks. Prior to 2004, the physio-chemistry data taken from the shafts and it was used as part of mine water rebound and risk assessment. Since 2004, pumping of the mine system has been undertaken at Horden and Dawdon mines, to prevent pollution of an overlying aquifer.

The discrete depth samples and electrical conductivity-temperature logs show variations in chemistry and water temperature. These variations are throughout time, and with the water columns in the shafts. Analysis and assessment of data from four shafts in the coalfield has been undertaken. Trends in data have been used to confirm and improve the knowledge of the mine system and how it interacts with the environment. Spatial and temporal trend analysis was undertaken at each shaft, and the assessment of each shaft was input in to the conceptual model to create a temporal-spatial analysis of the mine system.

Changes in the mine water can be used to predict things about the mine system, such as sources of recharge; and predominant flow pathways within the mine system. Such changes not only give confidence in the conceptual understanding, but can also be used to confirm risk, and that best mine water management options are being utilised now and in the future. The data obtained can also be used to help assessment of mine water energy schemes, and how these schemes and water management options may influence the physio-chemistry of the water.

**Keywords:** Chemistry, Temperature, Post-Closure, Water Management, Stratification

## Full Paper

A full paper on the results of this study will be published in an upcoming issue of the “Mine Water and the Environment” journal. If you have further interest or questions in the meantime, please contact the authors.