

Long-term trends of changes in the quality of water discharging from abandoned coal mines have been studied for 32 long-established discharges in the Midland Valley of Scotland. Six discharges have been studied in greater detail, providing insights into discharge quality evolution over more than a century. It has been found that minewater pollution is most severe in the first few decades after a discharge begins (the 'first flush'), and that even the largest systems settle down to a lower level of pollution (particularly in terms of iron concentration) within 40 years. Long-term iron concentrations of less than 30 mg/l are typical, and many are less than 10 mg/l. Low pH values (which might justify the over-used term 'acid mine drainage') do not generally persist, due to the rapid buffering of localized acidic waters by carbonates (both natural carbonates, and those introduced as rock powder for fire precautions during mining). This is corroborated by alkalinity concentrations, which tend to be highest in the early years of a discharge. While the pyrite content of the worked sequence strongly influences initial water quality (in terms of pH, iron and sulphate) during the 'first flush', there appears to be no correlation between long-term iron concentrations of discharges and pyrite content of local strata. Rather, higher levels are found in any sequence where there is scope for fluctuations of the water table in worked ground near to the discharge. A scientific approach to minewater remediation should allow for active treatment of discharges for the first decade or two, followed by long-term passive treatment after asymptotic pollutant concentrations are attained.