

NATIONAL RIVERS AUTHORITY
AWDURDOD AFONYDD CENEDLAETHOL

WELSH REGION
RHANBARTH CYMRU



NRA

Guardians of the Water Environment
Diogelwyr Amgylchedd Dŵr

The Impact of Ferruginous Minewater Break-outs
on the Environmental Quality of the
Rivers Rhymney, Ebbw and Sirhowy
Report No. PL/EAE/91/5

SUMMARY REPORT

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CIRCULATION

SUMMARY

Regional Manager
Regional Planning Manager
Environment and Quality Manager
Regional Environmental Appraisal Scientist

FULL REPORT

Environmental Appraisal Manager
Divisional Scientists (x3)
Senior Environmental Appraisal Officers (x3)
Divisional Pollution Control Manager (SE)
Divisional Fisheries and Conservation Officer (SE)
Area Pollution Control Officer (SE - Rhymney Area)

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1. SUMMARY

1. The Rhymney, Ebbw and Sirhowy have long suffered from severe pollution problems mainly due to the coal mining industry and sewage pollution as a direct result of the industrial revolution. However, the decline in industrial activity during the last decade, together with pollution control measures, has led to a gradual improvement in the quality of these rivers and the return of game fisheries to many reaches.
2. The closure of coal mines has more recently resulted in a new pollution problem. The cessation of pumping operations at a number of mines has caused a build-up of water in the mines which has resulted in ferruginous minewaters eventually overflowing and discharging, without consent into nearby watercourses. Such minewater emissions have resulted in discolouration and ferruginous precipitation in the rivers Rhymney, Ebbw and Sirhowy during 1991. The impact of these discharges has been the subject of this study.
3. Water quality, flow, biological and fisheries studies were carried out during 1991 to investigate the impact of recent minewater discharges on the receiving watercourses. These studies were carried out in part by an MSc student on a work placement with the Divisional EAU, who was also largely responsible for this report.
4. It was found that the conversion of the soluble iron salts in the minewaters into insoluble ferric hydroxide was relatively rapid within the receiving waters and this was attributed to neutralisation of the acidic minewaters, through contact with limestone strata, before they discharged to the surface.
5. Changes in pH, dissolved oxygen and iron concentrations in the rivers, as a result of the minewater discharges, were not considered a problem. Although some downstream readings were significantly different from those upstream of the minewater discharges, all observed values were found to be within limits recommended in the EC Fish Directive (Directive Number 78/659).

6. The biological quality of the rivers Rhymney, Ebbw and Sirhowy in the vicinity of the minewater discharges was generally moderate to poor and it was therefore difficult to identify any impacts due solely to the minewater discharges. However, a significant reduction in BMWP score was observed on the Rhymney in June at site 2 (50% decrease in score) below the minewater discharge. There was also evidence of some, seasonally variable, impact on the abundance of macroinvertebrate families below all three minewater discharges.
7. The main threat to the aquatic community is likely to be the blanketing effect of the ferruginous precipitate on the substratum. The decrease in the abundance of macroinvertebrates was attributed to the scarcity of primary food production and shelter in the affected areas.
8. No changes in fish population densities were observed due to the relatively poor baseline fisheries status of the rivers. There is very little natural recruitment and the recreational fisheries on these reaches are heavily dependent on stocking with adult trout. As adult fish are not particularly sensitive to iron precipitation, the impact of the minewater discharges on the fishery is unlikely to be significant.
9. However, any potential improvement in spawning success and survival of 0+ trout in these areas, due to general improvements in water quality and spawning habitat, is likely to be impaired as a result of the ferric hydroxide depositions.

6. RECOMMENDATIONS

- 1) Consideration should be given to an investigation of treatment options for the minewaters with a view to reducing or preventing further environmental damage.
- 2) Consideration should be given to a hydrogeological study of the mine system in order to identify other potential minewater sources and to predict where adits may appear in the future.
- 3) Trout egg survival studies should be carried out in order to assess the effects of the minewaters on spawning success of salmonids.
- 4) Biological monitoring of the receiving rivers should continue in order to assess any further impacts on the biological quality, especially with respect to seasonal changes and downstream extension of the area of impact.
- 5) Water quality sampling and flow gauging should continue at a reduced frequency so that the long term changes and the effects of the minewaters on river quality can be monitored.
- 6) Monitoring of dissolved iron concentrations should continue to ensure compliance with EC standards for salmonid and cyprinid waters.