

Metal Mines Strategy for Wales

Welcome to the latest edition of the Metal Mines Strategy for Wales Newsletter

Who are we?

The Metal Mines Strategy for Wales has provided the structure for the work Environment Agency Wales has been doing since 2002 to tackle pollution from abandoned mines.

As of 01 April 2013, <u>Natural Resources Wales</u> (NRW) will carry out the functions previously performed by the Environment Agency, Forestry Commission and Countryside Council in Wales, including the continuation of the Metal Mines Strategy.

The programme is managed by Trystan James, with Paul Edwards (South West) and Phil Goodman (North) as area leads. Technical support is provided by the Geoscience Team.

What are we doing?

Metal mine sites present significant sources of land contamination, water pollution and sometimes air pollution. Across Wales abandoned mines are the number one reason for waterbodies failing to achieve 'Good Status' under the Water Framework Directive (WFD).

We have an ongoing programme of assessment and have ranked the top 50 most polluting mines.

This year we are focusing our resources on completing the Frongoch remediation scheme where we secured £1.15 million in funding, 60% of which will come from Europe. We will also continue our detailed investigations at Dylife. On a wider scale, we are exploring better ways of working with the Coal Authority to help us tackle metal mine pollution.

We continuously investigate impacts across other catchments and work to find solutions for dealing with these in the future. We are working with others, including the Coal Authority, universities, local authorities, landowners, mining enthusiasts and anyone else with an interest in mine water remediation.

The metal mines group will soon look to expand its representation to ensure other functions of NRW are included in efforts to tackle the problem.



Tailings dumps at Frongoch Mine prior to remediation

Funding

We continue to identify priority sites for remediation and develop a business case to secure funding. We are currently working on a joint bid with Cardiff, Aberystwyth and Bangor Universities to secure funding from January 2014 through the European Regional Development Fund. We are also exploring Insurance recovery as means to secure money for remediation.

Water Framework Directive Investigations Project

Our Wales-wide WFD abandoned mines project came to a close in March 2013, having been extended to allow a full year's water quality data to be gathered at all investigation sites. We assessed metal concentrations in over 90 waterbodies, substantiating Environment Quality Standard failures, identifying reasons for these failures and, where possible, apportioning sources. The results of this project will inform our future remediation programme, ensuring that we continue to prioritise and deal with the most polluting mines.



We also completed a detailed study of the River Ystwyth catchment during summer 2012 in partnership with Swansea University.

For more information on the Metal Mines Strategy contact:

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Ongoing work in 2013

Frongoch Mine

Construction started in January 2013 on a two year project to further reduce the pollution to the River Ystwyth from Frongoch Mine, near Pont-rhyd-ygroes. The first phase of these works involved the construction of a surface water drain around the mine, which directs water to a new lined pond.



Stone built culvert under Frongoch Mine

This will reduce the amount of water that flows through contaminated mine waste, control the amount of water that leaves the site, and help to keep clean water separate from contaminated mine water. This first phase was completed in May 2013 and initial monitoring results indicate a 50% reduction in pollution. We will continue to assess the benefits of the first phase of remediation in collaboration with an MSc student from Swansea University.

We plan to carry out a second phase of remediation

in 2013/2014, which will involve capping the mine waste and creating a new wetland area to further purify the water flowing from the site. This second phase will be dependent on obtaining planning permission from Ceredigion County Council and agreement with the landowner.



Excavating the new pond at Frongoch Mine

Cwm Rheidol Mine

Our pilot-scale passive treatment system at Cwm Rheidol Mine has now been in operation for two and a half years and has continued to successfully remove the vast majority of the metals from the mine water that passes through it. Generally the system has performed best in the summer with a reduction in performance in the colder winter months. The results were reviewed by Newcastle University along with two other similar projects in England and a draft report was produced in March 2013. We shall continue to monitor the system on a fortnightly basis.

Upper Teifi Mines

Abbey Consols Mine, near Pontrhydfendigaid, is the largest source of zinc to the River Teifi, discharging over 2 tonnes per annum. Following recommendations by Atkins Ltd, modifications to site drainage channels were made in 2011 to allow more accurate flow monitoring. We recently completed an extensive monitoring programme, collecting water quality and flow data on a fortnightly basis to inform the design of a future remediation scheme to reduce the metals load from this site.



Esgair Mwyn Mine, near Ffair-Rhos, is the largest source of lead to the River Teifi (via the River Meurig), and is contributing to the Teifi failing its Environmental Quality Standard for zinc for over 35km. In 2005 we commissioned Parsons Brinckerhoff Ltd to carry out a feasibility study. This highlighted the suitability of the site for a passive treatment system utilising anaerobic wetlands. We completed a detailed water guality and monitoring programme during the summer of 2012 in collaboration with an MSc student from Swansea University. The findings of this MSc report will be used to focus our sampling efforts and inform the design of any future remediation scheme at the mine. Alternative treatment methods such as reprocessing the mine waste are also being considered.

We are currently seeking funding to review remediation options at both Abbey Consols and Esgair Mwyn mines and to produce designs for the preferred options.



A snowy spoil heap and derelict processing plant at Esgair Mwyn Mine

Nant y Mwyn Mine

Nant y Mwyn Mine is a significant source of metals to the River Tywi and has been identified as causing the river to fail its Environmental Quality Standards for cadmium and zinc. A Cardiff University MSc project completed in 2011, and our WFD abandoned mines investigation has given us a better understanding of the primary contaminant sources and pathways at the site. This information will assist in the design of possible future remediation schemes. We are currently in discussion with Cardiff University and a local company about the possibility of trialling a novel small-scale treatment system using hydroelectric power at this site.

River Clarach Catchment

The River Clarach, north of Aberystwyth, is failing Environment Quality Standards for cadmium, copper, lead and zinc. Numerous abandoned mines, including Cwmerfyn, Cwmsymlog, Bwlch and Daren, are located within the catchment and are believed to be the primary cause of this metal enrichment. We have entered into a collaborative agreement with Aberystwyth University, providing support to an MSc student investigating pollution from these mines on a catchment scale. This project is due to be completed by autumn 2013 and it is hoped that this will lead to a better understanding of the main sources and pathways of metalliferous pollution impacting on the Clarach and its tributaries.

For more information on the Ystwyth, Rheidol, Teifi, Tywi and Clarach catchments contact: Paul Edwards Email: <u>paul.edwards@naturalresourceswales.gov.uk</u> Tel: 01792 325610

Dylife Mine

The latest phase of investigations at Dylife has been completed by mining consultants URS. A number of data loggers to measure key water levels have been installed in the River Twymyn using stilling wells. Loggers have also been installed at key points within the mine workings along the valley. The objective of this work is to gain a greater understanding of the complex interrelationship between surface water, groundwater and drainage flow through the flooded underground workings of the mine. Preliminary results have shown an interesting set of 'switches' within the mine; as water flow increases during rainfall events, underground workings which convey flow fill up, causing the river to re- establish flow in the channel.

URS have also carried out extensive surveys of the spoil tips on site using a technique called X-ray Fluorescence (XRF), the results of which will be



compared with laboratory testing of metal concentrations. This will allow us to determine which tips have the greatest contaminating potential, and also enable us to decide on future use of XRF.

We have installed a mobile weather station on site which was donated from a closing Environment Agency Wales project. This is working well and provides real time data, enabling rainfall to be related to fluvial flow and flooding scenarios in the mine workings. This data is publically available at: www.meteovue.net/stations/26.



The River Twymyn flowing through spoil at Dylife Mine

We are also monitoring the progress of an embankment collapse at the mine which could impact the C road which runs through the site.

We have recently been successful in winning a bid for a Knowledge Economy Skills Scholarship with European funding being awarded to Aberystwyth University. NRW staff will contribute to this sponsorship of an M Phil Student with supervisory time. URS have kindly agreed to assist with this element of the project also, and will provide a handover to enable the project work to continue in a new and very useful direction. The student, who has now been selected, will be working towards a full understanding of the mechanisms of transport of contamination in the riverine environment at the Dylife site. This work will help to inform the design and instigation of mine site remediation at both this and other similar sites, helping the UK to meet its obligations under the WFD.

Parys Mountain

Parys Mountain Mine was the world's largest source of copper in the 18th Century and played a pivotal role in the history and economy of this country. It was the source of the copper sheathing which gave Nelson's ships the advantage at Trafalgar.

Today the site is a valuable resource for tourism, research and education, but is also one of the biggest sources of pollution, discharging more metals into the Irish Sea than the River Mersey despite having less than 0.3% of the flow.

The monitoring programme continues at the Dyffryn Adda site where the primary acid mine drainage enters the Afon Goch and heavily contaminates a 3km stretch of the river.

Environment Agency Wales funded a number of extensive feasibility studies to investigate a solution to the issue. We now have a clearer idea of the options available and the likely costs.

We continue to monitor the metal loadings being transferred to the river environment to allow a detailed design of a treatment plant to be made when funding opportunities permit.



Parys Mountain opencast and windmill tower

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