Remining Data Requirements and Use

Remining Information Series

Background

The federal Environmental Protection Agency (EPA) and Office of Surface Mining and Reclamation Enforcement (OSMRE) recognized that one of the most successful means for the improvement of abandoned mined lands (AML) is to encourage mine operators to remine the previously disturbed areas and extract the remaining coal reserves. As part of remining operations, the mine operator improves aesthetics and decreases pollutional discharges by backfilling and revegetating the areas. Safety and environmental hazards also are reduced. Mine operators had been reluctant to remine these sites with pre-existing discharges due to the potential permanent liability for the pre-existing discharges.

The 1987 Rahall Amendment to the Clean Water Act (CWA) provides incentives for the remining of unreclaimedmined lands abandoned prior to the passage of the Surface Mining Control and Reclamation Act (SMCRA) of 1977. These incentives include an exemption on remining operations from technology-based effluent limit standards for discharges that are hydrologically related or connected to the mine site. The permitting agency can set site-specific alternate numerical limits for pre-existing discharges based on professional judgment. Additional incentives were developed to encourage more remining by extending exemptions to effluent limits for total suspended solids (TSS) and the inclusion of BMP (Best Management Practices) non-numeric discharge permit requirements. The applicant mines under a revised set of water-quality limits that are established based on no less than baseline conditions. The applicant also must demonstrate in the permit application that the abatement or reduction of the pollution loading of the pre-existing discharges will result from the proposed mining and reclamation operation.

Baseline date requirements

A minimum of 12 monthly samples (water quality and measured discharge rate) are required for baseline sampling. The samples must be collected in consistent (i.e. four-week) intervals. The sampling time interval precludes biasing the data from possible serial dependence. The number of samples is based on the need to detect a change (decrease or increase) of one standard deviation in the mean or median with at least a 0.75 probability. The probability is based on the two-sample t-test or Wilcoxon-Mann-Whitney U test. If additional sampling is conducted that is less than a full year, care must be taken to ensure that any fraction of a year does not unduly weight a wet or dry season in the baseline data set.

Accurate measured flows are an essential requirement because flow rate tends to be the strongest component of loading rates. Estimated flows are **unacceptable**. Only scientifically valid and reproducible flow measurement methods should be used.

The reported chemical parameters include net acidity, iron, manganese, total suspended solids (TSS), and sulfate. The Rahall Amendment originally stated that a pH load (not acidity) was to be established. However, this was modified in the January 23, 2002, final rule due to problems with establishing pH loading and because acidity loading is a more accurate indicator of water quality improvement. Sulfate, while not a regulated ion, is a good indicator of AMD production. If any of the regulated parameters are below best available technology (BAT), the concentrations should be substituted for the actual concentrations used for the loading calculations. Loading rates, usually in lbs/day, are calculated from the flow and water quality data.

Due to the extreme disruption caused by remining and reclamation, discharges will frequently change their location and may combine with previously separate discharges. Therefore, remining affords the flexibility to physically combine discharges for baseline sampling or mathematically combine the discharge data for alternate effluent determination of a hydrologic unit.

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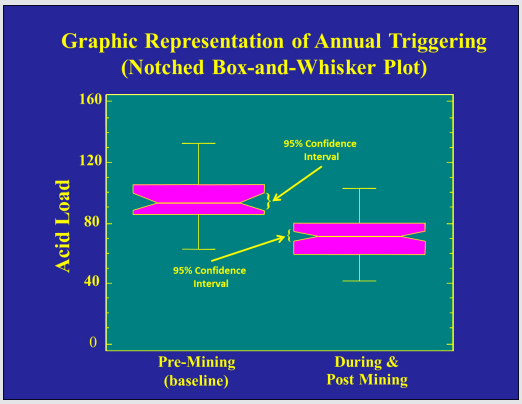
The revised effluent limits cannot exceed (be worse than) the baseline. Revised limits may be established at a level between baseline and conventional effluent standards. The new limits are established based on the baseline data and best professional judgment of the permit writer on the best management practices (BMPs) proposed to improve the water quality. The operator is encouraged to increase the degree of BMPs to be implemented in order to receive the new limits at baseline. Underpinning any remining permit application is that the potential to improve the water quality must be demonstrated.

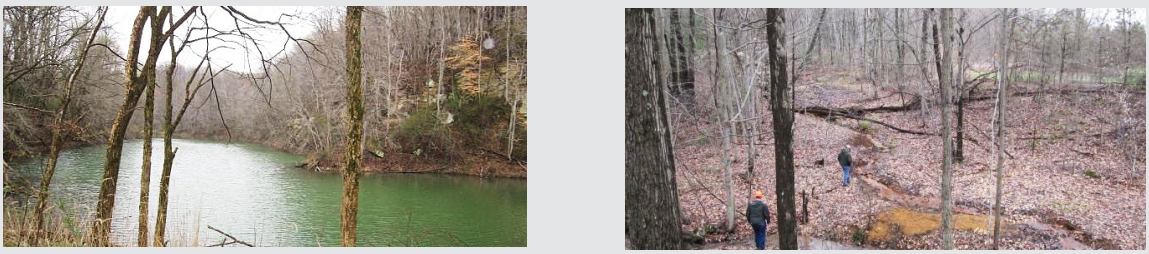
The impacts of remining based on the water quality can be assessed by a monthly check method or an annual data analysis. The first method entails a monthly comparison or check of the data. Each monthly sample is compared to an effluent limit called a “single observation trigger,” which is based on a 95% confidence. If two consecutive monthly samples exceed the single observation trigger, this initiates weekly sampling. Four consecutive weekly samples exceeding the single observation trigger initiates treatment of the discharge(s) to meet the alternate effluent standards. This continues until the discharge no longer exceeds the single observation limit without treatment.

The annual data analysis determines if there is a trend of increasing pollution loadings. The annual method utilizes a comparison of a 95% confidence interval about the medians of the baseline data and the during-mining or post-mining data on an annual basis. If the confidence intervals overlap this indicates that the median values are not statistically different, as depicted below. If there is no overlap, the median values are different and this indicates that there has been a significant change in the discharge. A higher median value for the during- or post-mining data indicate that the discharge has been degraded due to mining.



Alternate effluent limits only apply to pre-existing discharges that are hydrologically connected to pollution abatement areas of the remining operation. While discharges are physically encountered by the operation (e.g., accumulating in the pit), conventional, effluent standards apply. Once the discharges are no longer being encountered, the alternate limits are again valid.

In situations where there are a large number of widely dispersed discharges, the discharge emanates in a physical location such that an accurate flow measurement cannot be made or a valid water sample cannot be collected. When the discharge is so large that an accurate flow measurement cannot be obtained, or any other reason that accurate sampling cannot be conducted, there is a provision to use a “BMP only” type of permit. In these cases, the permit will define the BMPs that will be conducted, details of each BMP, scope and level of each BMP, timing of implementation of each BMP, and other pertinent information. Compliance is based on performance of the BMPs as defined in the Pollution Abatement Plan and is approved in the permit.



Dispersed discharges (right) from a highwall pit complex (left) at a site in Coshocton County, Ohio.

Success is measured through inspection to ensure that the BMPs were conducted as approved. The receiving stream may be monitored to gauge the overall impact of the operation. Details of commonly used BMPs are covered in the companion BMP fact sheet.

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For further information, contact **Robert Baker** at baker.1594@osu.edu or learn more at https://ccp.osu.edu/about/remining