

# Technical Reclamation Memorandum

TRM # 4

Date: December 6, 1982  
From: William C. Eddins, Director  
Division of Reclamation Services  
Subject: Substitution of Total Sulfur  
for Pyritic Sulfur for Pre-mining  
Geologic Data Collection



The geologic data collection sections of the permanent program regulations require that a permit application for surface mining activities or for underground mining activities (surface operations area) contain a description of acid-forming, toxic-forming, or alkaline producing materials for the overburden including the stratum immediately below the coal seam to be mined [8:030, Section 13(2)(a)4; and 8:040, Section 13(1)(a)4]. In addition, a permit application for underground mining (underground operations area) is required to provide similar information for the stratum immediately above and below the coal seam to be mined [8:040, Section 13(1)(b)3].

The Hydrology and Geology Guidelines for the Permanent Regulatory Program recommend the use of maximum potential acidity and neutralization potential to describe acid or toxic-forming materials and alkaline producing materials, respectively. Consequently, applicants can satisfy the above regulatory requirements to address acid-forming, toxic-forming, and alkaline producing materials by submitting maximum potential acidity and neutralization potential test results in accordance with the guideline recommendations.

However, in addition to the parameters recommended in the guidelines, the geologic data collection sections of the permanent program regulations require (1) that a permit application for underground mining activities (underground operations area) describe the pyritic sulfur content of the stratum immediately above and below the coal seam to be mined and (2) that a permit application for surface mining activities and for underground mining activities (surface operations area and underground operations area) describe the total sulfur and pyritic sulfur content of the coal seam [8:030, Section 13(2)(a)5 and 8:040, Section 13(1)(b)4]. Thus, there are two parameters (total sulfur and pyritic sulfur) which must be addressed in addition to the guideline recommendations.

To reduce the amount of geologic testing which applicants must perform, the department will allow total sulfur to be substituted for pyritic sulfur. Thus, for the stratum above and below the coal seam for underground mining activities, the department will accept total sulfur in lieu of pyritic sulfur, and for the coal seam for both surface and underground mining activities, the department will allow total sulfur to be substituted for pyritic sulfur and will not require a separate determination of pyritic sulfur.

Since total sulfur can be used directly to determine maximum potential acidity, the above substitution will allow a single test for total sulfur to provide the information required by the regulations for (1) rock strata (pyritic sulfur and potential acidity, and (2) the coal seam (total sulfur, pyritic sulfur, and potential acidity).

The department's rationale for accepting total sulfur as a substitute for pyritic sulfur is based on the following:

(1) A prediction of a coal or rock stratum's potential to produce acid mine drainage which is based on total sulfur will be environmentally conservative since total sulfur contains all forms of sulfur including pyritic sulfur which is the primary contributor to acid mine drainage.

(2) Since rock strata generally do not contain significant amounts of non-pyritic sulfur (organic sulfur or sulfate sulfur), potential acidity values derived from total sulfur should be comparable to potential acidity values based on pyritic sulfur for rock strata.

For those situations in which applicants elect to substitute total sulfur for pyritic sulfur, the department will use maximum potential acidity as derived from total sulfur to determine the potential of an operation to produce acid mine drainage. If an applicant feels that total sulfur significantly overestimates the potential for an operation to produce acid mine drainage, the applicant may perform additional testing to determine the pyritic sulfur content and corresponding pyritic based potential acidity and submit this information in the permit application along with the total sulfur test results. If the pyritic sulfur content and pyritic based potential acidity are submitted in a permit application, the department will use the pyritic based potential acidity to determine an operation's potential to produce acid mine drainage.

Finally, applicants should always bear in mind that geologic or other data collection requirements contained in the permanent program regulations which are not addressed in guidelines or in a TRM, such as the requirement to determine the clay content of the floor of underground workings, must be submitted in a permanent program application. Our guidelines and TRM's are not substitutes for the regulations, but merely explain or supplement the regulations.