

THE COMPLEXITY OF ACID MINE-DRAINAGE

Acid mine-drainage is not a simple dilute solution of pure acid. As has been pointed out, all of the soluble materials with which it has come in contact have affected its quality. Even the acids it has picked up are not simple solutions. They have been formed by the oxidation of pyrite into any one of a series of iron sulphate salts, or from aluminum sulphate salts, which the water has dissolved and diluted and which may be acted upon further by other material which the water may contact. *Acid mine-drainage is variable and extremely complex. Whenever possible, prevention is preferable to treatment.*

While acid mine-drainage is not necessarily harmful when consumed by man or animals, it is often harmful to fish and other aquatic life. It usually degrades water quality for many uses and must be regarded as a serious source of water pollution. It is polluting if it causes a condition in the receiving stream which adversely affects the treatment procedure of a municipal water supply, causes excessive expense by other industries, is harmful to fish and other aquatic life, or has deleterious effects upon other users of water. We can conclude, therefore, that EVERY PRACTICAL EFFORT MUST BE MADE TO PREVENT THE PRODUCTION OF ACID MINE-DRAINAGE AND TO AMELIORATE ITS POLLUTIONAL EFFECTS.

SUMMARY

- (1) Acid drainage is a natural occurrence which is generally increased by the mining process. (Ref. 1, 3, 4. See Appendix III).
- (2) If we could completely eliminate either air or water from coal mining operations there would be no acid mine-drainage. (Ref. 7).
- (3) The amount of acid contributed by a given material is related to the length of time that material is exposed to air and water; however, complete submergence under water will prevent exposure to air, thereby eliminating acid production. (Ref. 2).
- (4) Oxidation of the acid-producing materials associated with coal mining is necessary for the formation of mine acids. (Ref. 3, 4, 6, 7, 9).
- (5) As water passes through the mine, or over or through mined materials, and comes in contact with acids, it dissolves them and becomes their transport agent. Generally speaking, the longer water remains in contact with acid materials, the more acid it will pick up and transport. (Ref. 1).
- (6) Both acid-producing and acid-neutralizing materials occur in all coal measures, although the amount and character of each may vary considerably from mine to mine. All coal mines have acid-producing potentials, even though all coal mines do not produce acid mine-drainage. (Ref. 2, 4, 5).
- (7) The exercise of control to decrease the production of acid and increase neutralization by alkali, will have a beneficial effect upon the character of the mine-drainage. In no case should the principle of neutralization of acid water be substituted for acid prevention principles. (Ref. 8, 13).
- (8) Control of acid mine-drainage need not require the attainment of completely neutral conditions in all cases.
- (9) The pH measurement is used to indicate the acid or alkaline character of water, and warn of possible extremes. (Ref. 10, 11).
- (10) The determination of the amount of neutralization necessary to control the acid character of a given mine-drainage is a laboratory procedure. (Ref. 10).
- (11) Dilution to ameliorate the pollutional effects of acid mine-drainage should be practiced whenever feasible. (Ref. 4, 14).
- (12) Acid mine-drainage is variable and extremely complex. Whenever possible, prevention is preferable to treatment. (Ref. 1, 3, 4, 10, 11).