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Coal Mine Water Pollution: an Acid Problem With Murky Solutions

By J. T. BEGLEY* and JOHN PHILIP WILLIAMS**

I. INTRODUCTION

Since 1973 the American public has been bombarded by news of the “energy crisis” and the need for “national energy independence.” This public awareness of energy needs has spurred the creation of a new federal agency, the Federal Energy Administration (FEA), which has initiated “Project Independence,” a national program designed to achieve energy independence for the United States in the 1980’s.1 In speeches throughout the country, FEA officials have declared that to achieve this goal our country must double its annual coal production.2 Together with the construction of highly controversial nuclear power plants, FEA officials cite this increase as the immediate solution to the “energy crisis,” and if the raging controversy over nuclear power plants halts construction for any significant time, the nation may be forced to rely even more heavily on coal in its quest for energy independence.

The national commitment to the rapid development of America’s vast coal reserves potentially conflicts with another important national goal enunciated by Congress in the Federal Water Pollution Control Act Amendments of 1972.3 The Act, which established a national commitment to clean water, set interim goals for water pollution abatement4 leading to an ulti-

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The authors gratefully acknowledge the assistance of Neil G. McBride and Richard M. Hall in the preparation of this article.

2 Id.
4 By July 1, 1977, polluters shall be required to use “the best practicable control technology currently available” for the abatement of pollution from their operations. By July 1, 1983, polluters shall be required to use “the best available technology economically achievable.” 33 U.S.C. § 1311(b) (Supp. IV, 1974).
mate goal of total elimination of pollutant discharges into the nation's water by 1985.\(^5\)

The attainment of both goals—increased coal production and clean water—will require substantial expenditure by the coal industry for water pollution abatement.\(^6\) Contrary to much popular opinion and concern, however, expenditures for environmental protection account for only a small fraction of the total increased costs of coal which have boosted consumers' electric bills so high in the last 2 years.\(^7\) Much of the increase resulted from the Arab oil embargo, which hiked the price of oil almost overnight.\(^8\) Other factors which have increased the costs of coal include increased labor and capital costs, increased coal taxes, and increased health and safety costs. The costs of environmental protection pale in comparison to these larger costs.\(^9\)

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\(^6\) The National Commission on Water Quality has estimated that the coal industry will have to spend almost $1.7 billion to comply with the Act. NATIONAL COMMISSION ON WATER QUALITY, STAFF DRAFT REPORT, ISSUES AND FINDINGS, I-36 (1975).

\(^7\) Since 1974, almost all electric utilities have been allowed to pass on any increases in the costs of coal or other fuels directly to their customers without following the normal procedure of petitioning a state's public utilities commission for permission to raise rates. This procedure is widely known as the "fuel adjustment clause." Since the price of coal has doubled or even tripled in most areas in the last 2 years, the use of this controversial procedure by utilities companies has caused customers' electric bills to rise dramatically during this time. H.B. 197, introduced into the 1976 Kentucky General Assembly by State Representative Louis G. DeFalaise (R. Covington), would have required periodic auditing by the Kentucky Public Service Commission of these passed-through costs. But the House Committee on Public Utilities and Transportation refused to post the bill for consideration, and it died in committee.

\(^8\) Since coal and oil are somewhat interchangeable in the utilities market, the demand for coal has increased as utilities have found it cheaper to burn coal than oil, causing a consequent increase in the price of coal. R. MINEAR & B. TSCHANTZ, CONTOUR COAL MINING: OVERBURDEN AS SOLID WASTE AND ITS IMPACT ON ENVIRONMENTAL QUALITY (University of Tennessee Appalachian Resources Project, Pub. No. 30, 1974).

\(^9\) In a recent newspaper article, Fred Wyatt, Executive Director of Facts About Coal in Tennessee (FACT), the Tennessee coal operators' association, enumerated various increases in the costs of mining coal from 1967 to 1975. He said the cost of a bulldozer has risen since 1970 from $94,500 to $186,000, the cost of a ten-yard end loader from $100,000 to $225,000, and the cost of a hundred pounds of explosives from $3.50 to at least $11.00. The price of diesel fuel has tripled since 1970 from 11 cents to 35 cents per gallon, and the price of a single tire for an end loader has gone from $1,400 to $2,439. Wyatt said the total cost of a mining company's equipment has almost doubled in the last 8 years, and the average royalty paid to the landowner per ton of coal has risen from $.25 in 1967 to between $1.65 and $2.20 in 1975, an increase of over 600 percent. The costs of labor have increased to about $14 per person per hour,
This article will examine the nature and extent of coal mine water pollution and the effectiveness of state and federal regulatory efforts. As coal companies gear up to double the nation’s coal production in the next decade, the regulatory efforts to abate coal mine water pollution will become increasingly important if this nation seriously desires both clean water and electricity.

A. Coal Mine Water Pollution: A Description of the Problem

Coal mine water pollution is a problem in two forms: physical pollution, resulting from increased deposits in mountain streams when the soil’s protective vegetative cover is removed by excavation, and chemical pollution, caused by the dissolution and oxidation action of surface elements on exposed minerals in the overburden. Erosion, the beginning of physical pollution, is usually a gentle process, with soil particles slowly detached by the impact of raindrops. Strip mining drastically accelerates this process. One eastern Kentucky study found that the average erosion and runoff for unmined, undisturbed land was 25 tons per year per square mile of drainage. The average yield for spoil banks (the unrevegetated material moved during strip mining to expose the coal seam) was over 27,000 tons per year per square mile, more than 1,000 times greater. Another federal study revealed that over 1 million tons of sediment annually enters the New River Basin in eastern Tennessee from strip mine sites and haul roads leading to the sites. The costs are not simply societal, but are brought including salary and fringe benefits, an increase of 300 percent since 1967. Workmen’s compensation costs have risen about 25 percent. Wyatt also described the demand for coal after the Arab oil embargo as a “classic seller’s market.” Coal Pricing Probe Welcomed by FACT, Knoxville Journal, August 28, 1975, at 1, col. 2.

13 U.S. Dep’t of Agriculture Soil Conservation Service, A Study of Sediment Sources in the New River Basin of Tennessee (Sept. 1973). The portion of the New River Basin under study contained 146,000 acres, of which 7,700 acres had been dis-
home in a personal way to residents along the mountain streams. For example, a University of Tennessee study has estimated the damage to nearby farmland at between 39 and 74 cents per ton of coal mined in three selected watersheds.\footnote{Increased sediment deposits damage both land and water by reducing the carrying capacity of streams, clogging reservoirs, destroying habitats for fish and other aquatic life, filling navigation channels, increasing flood crests, degrading facilities for water-based recreation, increasing industrial and water treatment costs, prematurely aging lakes, and reducing productivity of flood plain soils.\footnote{Clogged with silt and other debris from mine runoff, the carrying capacity of small streams and rivers is substantially reduced, making it more likely that streams will flood beyond their normal banks during periods of high rainfall.\footnote{Much of the silt and debris from the mines is deposited on the fields and lowlands adjoining the flooding stream, diminishing the value of those lands for farming and other uses and occasionally jeopardizing the houses and lives of their owners.}}}

The major source of chemical pollution is the formation of acid sulfide minerals, often present in overburden material, which, when exposed to air and water, react chemically with the oxygen in these elements to produce sulfuric acid. The chief mineral responsible for acid formation in coal producing areas is pyrite, an iron and sulfur compound. Essentially, acid mine drainage is a function of the type and amount of pyrite present in overburden material, the length of exposure, other characteristics of the mining, and the construction of haul roads to the mining sites. With the increasing demand for coal, the study predicted that another 7,000 acres in the watershed would be disturbed by strip mining by 1980.\footnote{R. Minear & B. Tschantz, A Progress Report on NSF/RANN Funded Research Related to Environmental and Economic Aspects of Coal Production 84-88 (University of Tennessee Environmental Center, Pub. No. 29, 1974). The average damages per household were $1,795, and $1,249 respectively for each of the three watersheds. These damages were primarily those inflicted on people's land and crops by flooding and siltation.\footnote{Minear & Tschantz, supra note 8, at 9-11.}}

\footnote{Id.}

\footnote{U.S. Dep't of Interior, Environmental Effects of Underground Mining and Mineral Processing 97 (Jan. 29, 1971) (unpublished working paper) [hereinafter cited as Environmental Effects.] This study was not endorsed or published by the Department of the Interior.}
teristics of the overburden, and the amount of available water.\textsuperscript{18}

Acid drainage affects the surrounding environment by reducing the pH of both soil and streams to an extent that is not conducive to most vegetative growth. For example, if the pH of a stream is reduced below 5.0, the stream is incapable of supporting fish.\textsuperscript{19} This type of pollution is responsible for a major share of the economic damage resulting from coal mine water pollution.\textsuperscript{20} In fact, it is estimated that 5,700 miles of Appalachian streams are affected by acid drainage.\textsuperscript{21} The major source of acid drainage is not surface mining, but inactive mines and refuse piles, which account for 78 percent of the total drainage.\textsuperscript{22}

In addition to acid, other minerals also contribute to the degrading of water resources. Metals found naturally near the surface of the land normally leach out slowly over thousands of years through the action of rain and surface runoff. But the disturbance and removal of subsoil layers and the alteration of surface and subsurface water patterns during the mining process causes leaching to accelerate. In addition, as the pH of water is lowered by acid formation, some minerals such as iron, manganese, copper, and zinc, become more soluble and enter the pollutant solution.\textsuperscript{23}

Coal mine water pollution, therefore, is not just an aesthetic problem. The failure to control this pollution effectively has caused substantial economic harm to the entire Appalachian region. Pollution and flooding have destroyed homes, farmland, and the spirit of scores of communities. Federal and state efforts to abate this pollution have been stimulated by these concrete economic problems more than by aesthetic

\textsuperscript{18} \textit{Environmental Protection}, supra note 10, at 197.


\textsuperscript{20} More than 90 percent of acid water pollution is associated with coal mining. \textit{Appalachian Regional Commission, Acid Mine Drainage in Appalachia}, H.R. Doc. No. 91-181, 91st Cong., 1st Sess. 116 (1969) [hereinafter cited as \textit{Acid Mine Drainage}].

\textsuperscript{21} \textit{Environmental Protection}, supra note 10, at 74.

\textsuperscript{22} \textit{Acid Mine Drainage}, supra note 20, at 36; \textit{Environmental Effects}, supra note 17, at 38.

\textsuperscript{23} \textit{Acid Mine Drainage}, supra note 20, at 116.
losses. Nowhere is the human cost of water pollution more apparent than along the banks of the red, silt-choked streams of the Appalachian coal fields.

The magnitude of mine-related water pollution has already reached startling proportions. In 1965, a U.S. geological survey of stream quality in the Appalachian coal region found that 61 percent of the major streams in the area of 160,000 square miles were measurably influenced by mine drainage. An estimate made in 1969 indicated that it would cost approximately $6.6 billion to clean up our Appalachian water streams. The severity of this environmental impact becomes apparent in light of the present predictions of soaring national fresh water requirements in the near future.

B. A Brief History of Regulatory Efforts

Controversy raged in Congress in 1974 and 1975 over the need for federal strip mine legislation. Congress twice passed a strip mining bill, but both times the bills were vetoed by the President and his veto sustained. In his second veto message, the President indicated that the legislation would unnecessarily curtail production at the very time the nation was striving to double its coal production within a 10 year period. Even though no federal law specifically regulates the environmental effects of coal mining, however, the Federal Water Pollution Control Act is being used to regulate coal mine discharges. It was amended by Congress in 1972, over a Presidential veto, to provide a very rigorous schedule for cleaning up the nation's waters by 1985.

The primary system for regulating coal mine water pollution, however, is at the state level. Most states with significant coal mining activity, particularly in Appalachia, have had strip mining regulatory statutes for several years, which have grad-

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21 194 out of 318 streams studied. Environmental Effects, supra note 17, at 102.
22 Id.
23 J. STACKS, STRIPPING 71 (1972).
24 National consumption of fresh water is expected to double by 1980 (base year is 1971) and triple by the year 2000. Environmental Effects, supra note 17, at 94.
26 Id.
27 E.g., Ala. CODE Tit. 26, § 166 (115) et seq. (Cum. Supp. 1973); Ark. STAT. ANN. § 52-901 et seq. (Supp. 1975); Colo. REV. STAT. ANN. § 34-32-101 et seq. (1973); Ill.
ually been strengthened by intense pressure from environmental groups and coalfield residents. Many of these states also have water pollution control statutes, which are sometimes used in controlling coal mine water pollution. In states such as Tennessee, where the strip mining statute and the water pollution statute both control coal mine water pollution, the regulatory system is often referred to as a "dual-permit system"; to strip mine coal in Tennessee, a company must obtain permits from two separate state agencies.

A distinction is sometimes made in state regulatory schemes between pollution from strip mines and pollution from underground mines. In Tennessee, for example, a strip mine company must obtain two state permits before mining can begin, and its activity is regulated by both agencies. By contrast, no state agency with a specific mandate to protect the environment regularly patrols underground mining, and state water pollution control officials will intervene only if the problem is gross or upon a specific citizen complaint. Some states have corrected this oversight. Kentucky, for example, enacted a statute in 1974 to regulate the surface environmental effects of underground mines. The Kentucky Department of Natural Resources and Environmental Protection is currently writing regulations to implement the statute.

Specific regulatory mechanisms vary from state to state, depending on the structure of state government and the functions of state agencies. The regulatory systems of Kentucky and Tennessee are described in detail, infra, as examples of the approaches taken at the state level to abate coal mine water pollution.


3 KRS § 350.151 (Supp. 1974).
401 Ky. Ad. Reg. § 1.001 (Proposed 1975) [hereinafter cited as KAR].
II. CURRENT FEDERAL REGULATION

Two federal statutes regulate coal mine water pollution, the Federal Water Pollution Control Act\textsuperscript{35} and the Rivers and Harbors Act of 1899.\textsuperscript{36}

A. The Federal Water Pollution Control Act Amendments of 1972

1. An Overview

The Water Act is administered by the Environmental Protection Agency (EPA). Its purpose is the prevention, reduction, and eventual elimination of water pollution in the nation's waters. It sets two goals: (1) To achieve water that is clean enough for swimming and other recreational uses, and clean enough for the protection and propagation of fish, shellfish and wildlife by July 1, 1983; and (2) to eliminate discharge of all pollutants into the nation's waters by 1985.\textsuperscript{37} To accomplish its goals the Water Act establishes a regulatory scheme for "point source" dischargers, persons discharging pollutants into the nation's waters from "any discernible, continued and discrete conveyance, including but not limited to any pipe, channel, ditch, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged."\textsuperscript{38} The scheme subjects point source dischargers to two sets of requirements: technologically-based effluent limitations guidelines, and water quality standards, both enforced through a permit system.\textsuperscript{39}

Effluent limitations guidelines limit the amounts of speci-

\textsuperscript{35} 33 U.S.C. § 1251 (Supp. IV, 1974) [hereinafter cited as the Water Act]. This statute is now more commonly referred to as the Federal Water Pollution Control Act Amendments of 1972 because the comprehensive amendments of that year virtually replaced the original Act.

\textsuperscript{36} 33 U.S.C. § 407 (1970) [hereinafter cited as the Refuse Act]. The Water Act has superceded the Refuse Act in large measure, but because the Refuse Act contains important water pollution control and enforcement machinery particularly as applied to certain coal mining operations, it continues to be a significant tool in the federal scheme.

\textsuperscript{37} 33 U.S.C. § 1251 (Supp. IV, 1974).

\textsuperscript{38} Id. § 1362(14).

\textsuperscript{39} Id. § 1342.
fied pollutants discharged from the point source and are set by EPA according to the availability of pollution control technology. The Act requires point source dischargers to adopt the "best practicable control technology currently available" by July 1, 1977 and the "best available technology economically achievable" by July 1, 1983. It further requires the EPA to define this statutory language by establishing national effluent limitations guidelines for every major industrial category such as the steel industry, the pulp and paper industry, and others.

National effluent limitations guidelines for the coal mining industry, to be achieved by the application of the "best practicable control technology currently available" and "best available technology economically achievable" were promulgated by EPA in "interim final" form on October 17, 1975, and again in "interim final" form on May 13, 1976. Although the October 1975 "interim final" guidelines proposed limits for eight pollutants typically discharged into streams from coal mining operations, the May 1976 "interim final" guidelines fixed limitations for only five of the original eight pollutants. EPA officials pointed out to the authors that the technological process used to remove iron has the fortunate result of also removing nickel and zinc thereby precluding the necessity of setting limitations for those elements. It has not been learned why aluminum was subsequently dropped as a parameter.

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15 Id. §1311(b)(1)(A).
16 Id. §1311(b)(2)(A).
17 Id. §§1311(b)(1)(A), 1314(b).
18 40 Fed. Reg. 48830-35 (1976); 40 Fed. Reg. 19832-43 (1976). The terms "proposed," "interim final," and "final" regulations are bureaucratic terms of art. As explained to the authors by EPA officials, proposed regulations are those published for public comment, subject to further agency study for purposes of possible change, but not enforceable. Interim final regulations, although published for public comment and subject to further agency study for purposes of possible change (thus not "final"), are, however, enforceable as though "final" and can be imposed in agency permits as regulations. As a practical matter the interim final regulations often become the final regulations with little or no change. Whether this is a semantic "distinction without a difference" we leave to the reader's judgment. The usefulness of the scheme, it would appear, is to enable the agency to perform its regulatory duties, particularly if an emergency need exists, pending promulgation of final regulations.
20 EPA has designated four subcategories within the coal mining industry to which it will apply the 1977 Best Practicable Control Technology standards, the 1983 Best Available Control Technology Standards and the New Source Standards. The follow-
Subject to EPA approval, individual states adopt water quality standards which establish and define the minimally acceptable water quality for rivers, creeks, streams, lakes and other common bodies of water. Water quality standards are a benchmark for effluent limitations. As a plan for water quality management of all streams and rivers as a whole, water quality standards are not enforceable per se although effluent limitations which regulate the quality of the effluent of a particular discharger are directly enforceable because any particular discharge is subject to immediate isolation and identification. If the water quality of an entire stream becomes too poor, the effluent limitations imposed on the polluters discharging into that stream may need to be strengthened. Only in this way can water quality standards be enforced. The necessity for both effluent limitations and water quality standards is clear.

| Parameters          | Average of daily values for 30 consecutive days not to exceed | Maximum for any 1 day (milligrams per liter) | Interim Final 1977 Best Practicable Control Technology
|---------------------|---------------------------------------------------------------|----------------------------------------------|---------------------------------------------------------------
| Interim Final 1977  | CURRENTLY AVAILABLE                                           |                                              |
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A. Coal Preparation

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B. Coal Storage, Refuse Storage, and Coal Preparation Plant Ancillary Area

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C. Acid or Ferruginous Drainage

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D. Alkaline Mine Drainage

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NEW SOURCES

A. Coal Preparation

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<td>and Coal Preparation Plant</td>
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B. Coal Storage, Refuse Storage, and Coal Preparation Plant

C. Acid or Ferruginous Drainage

D. Alkaline Mine Drainage

Water quality standards are essentially water use classifications established for all common waters with numerical limitations imposed on certain indicators to maintain water uses. Typically, the water use classifications are public water supply use, recreational use, aquatic life use, industrial use, and agricultural use, the purposes, in short, for which common waters are normally used. Typical state water quality programs assign each body of water one or more of these classifications based on the existing use and quality of the water. For example, if the water use in question is an “industrial use,” such as the use of water by an electric utility company for cooling, the water quality at the point at which water is withdrawn by the utility company must meet certain minimum requirements.

Water quality standards are supposed to maintain the quality of waters necessary to support any of the classified uses. For example, the water quality standards imposed on the stream used by an electric utility company for cooling, protect the waters from harmful levels of pH, temperature, and dissolved solids. High concentrations of these would make the water useless to the utility company for its industrial purposes. Polluters upstream from the electric utility company are subject to both effluent limitations imposed upon their own discharges and also to the water quality standards of the stream receiving the discharges in order to protect the water for downstream users.

If the effluent limitations/water quality dualism is to work properly, the pollutant wastes must be allocated among the existing and potential dischargers along any stream. Section 1313(d) of the Water Act requires a study of such allocation. Otherwise, nothing would prevent the issuing of too many permits along a stream with consequent degradation of high quality streams.

The enforcement mechanism for both the effluent limitations and the water quality standards is a permit system established by the Water Act entitled “National Pollutant

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46 See, e.g., Kentucky’s state water quality program as set forth in its administrative regulations, 401 KAR § 5:025 (1975) and 401 KAR § 5:035 (1975).
Discharge Elimination System" (NPDES). This replaces the 1899 Refuse Act permit program which was to have been administered by the Army Corps of Engineers. It applies the national effluent limitations guidelines to point source discharges, defines a schedule of implementing the guidelines for each point source, and requires monitoring through self-reporting by each point source discharger. The water quality standards of the discharger's state are considered when imposing national effluent limitations in the NPDES permit, and, under the Water Act, if the state water quality standards are stricter than the applicable effluent limitations, the more stringent state standards must be imposed in the permit.

The Water Act authorizes EPA to issue permits until a state has officially assumed the permit issuance function by showing that it will meet federal requirements. After state assumption of the permit program, uniformity and consistency of permit conditions nationwide will be maintained by the Act's grant of authority to EPA to veto any state permit it considers in noncompliance with the Act. Before a state may assume the permit function, it must establish and administer a water pollution control program which meets the requirements of the Act. Thus, although Kentucky is administering a program, its deficiencies prevent Kentucky's assumption of the NPDES program. Among these deficiencies are discretionary exemptions from permit conditions which vary from the Act's permit modification provisions, inadequate penalty provisions for permit violations, insufficient citizen involvement in notice provisions of the state program, and inadequate staff expertise to administer the program.

The Water Act requires all point source dischargers to

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20 Discussed at more length in the text as this country's first attempt at nationwide water clean-up, the permit program, which was to be administered by the Army Corps of Engineers for all industrial discharges, never became operational.
22 The EPA has promulgated guidelines for assumption of the NPDES program by the states. 40 C.F.R. § 124 (1975).
23 33 U.S.C. § 1342(b) (Supp. IV, 1974).
25 A REPORT FOR THE ENVIRONMENTAL QUALITY COMMISSION CONCERNING THE COMMONWEALTH OF KENTUCKY'S CAPACITY FOR ASSUMPTION OF NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM. (July 1, 1975).
apply for an NPDES permit. A Short Form application allows
the discharger to apply for an NPDES permit within the period
set by the Act, without a detailed discharge analysis. The infor-
mation required by this form is generally the type of product
produced, the discharge volume, the type of treatment, the
number of point source discharges, and a general description
of the discharge contents. A second and more elaborate Stan-
dard Form must be filed if a particular discharge meets certain
criteria. For example, a coal mining operation must submit a
Standard Form if the discharge from the operation has a total
volume of more than 50,000 gallons on any day, the discharge
affects the water of any state other than the state of origin, the
discharge may contain toxic pollutants, or the EPA Regional
Administrator or the state pollution control director deter-
mines that its submission is necessary.

The Act further requires each state to certify that every
proposed permit to be issued by EPA complies with all applica-
table state water quality standards. No permit can be issued by
EPA without state certification, and states cannot waive this
requirement. Thus, the states play an important role in the
permit program even though it is administered by EPA.

After a permit has been issued, any facility changes, pro-
duction increases, or changes in the character of the discharge
necessitate reapplication for a new permit. Permits can be
modified, suspended, or revoked upon a violation of the terms
or conditions of the permit.

The self-monitoring requirements imposed in the permit
are developed by EPA on an individual basis with considera-
tion given to the type of treatment, the impact of the proposed
treatment facility on the water, and the indicator to be mea-
sured. The monitoring program attempts to ensure that a treat-
ment facility consistently meets the effluent limitations im-
posed in the permit. The discharger must record and retain
data for at least 3 years, and the frequency for reporting moni-
toring results will be specified in the permit. After drafting the

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26 This is an unnumbered EPA administrative form.
27 40 C.F.R. § 125.12 (1975). More detailed procedures for the issuance of permits
have been published. 40 C.F.R. § 125 (1975).
29 E.P.A. Form 3320-4 (10-73).
permit, EPA forwards it to the state for certification. The state may add additional requirements in monitoring, compliance and effluent limitations if desired.60

NPDES permits are required for permanent and intermittent point source discharges from several types of coal mining activities: (1) *Underground Mines.* All activities, including surface runoff, portal pumpage, sump pumpage, and any discharge into or through old workings that result in a point source discharge, are subject to regulation. (2) *Strip Mines.* All activities associated with the recovery of coal and regrading of disturbed land which result in a point source discharge are subject to regulation. This type of point source discharge includes pumpage of groundwater, seepage, and precipitation or surface runoff entering the active mine workings, which is pumped, drained, or otherwise removed through the direct action of the mine operator to continue mining operations. (3) *Coal Preparation Plants.* All activities associated with the cleaning and preparation of coal for market which result in a point source discharge are subject to regulation, including the drainage from the preparation plants' coal yards, storage areas, and refuse disposal areas.61

EPA's Region IV office, whose area of responsibility includes Kentucky, Tennessee, and six other states, has further defined point source discharges from coal mines to include pumped or gravity drainage from the bench, pumped or gravity drainage from underground mines, discharges from silt basins, discharges from preparation plant operations, discharges from sanitary waste treatment plants, and discharges from other coal treatment facilities.62 Region IV officials have indicated that some discharges from strip mines normally will not require permits because they are not from point sources or because the discharges do not contain pollutants.63 Moreover, one unre-

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63 *Proceedings of the Institute for Mining and Minerals Research of the University of Kentucky, A Round Table Seminar: The National Pollutant Discharge Elimination System* 13 (1974). For example, old or abandoned mine workings and water which is diverted around a strip mine site from above the site are considered nonpoint sources.
solved question is when reclamation of a strip mine has been accomplished to such a degree that a point source discharge becomes a nonpoint source discharge, no longer requiring an NPDES permit. One citizens' group has suggested that the operator's responsibility under his NPDES permit should extend at least until his state revegetation bond has been released.64

Special exemptions may sometimes be prescribed by EPA for coal mining operations. For example, when the magnitude and duration of a storm is such that it is not practical for the discharger to treat such a high volume of water adequately, a special permit condition may allow him to bypass his treatment facilities to prevent their scouring. In its permits EPA sometimes allows that during, and several hours after, the occurrence of a major "precipitation event," the discharger need not sample his effluent discharge; he is simply not regulated during that time. The responsibility for proving the occurrence of a major "precipitation event," however, rests with the discharger.65

2. The Act in Operation in the Coal Fields

The Water Act mandated EPA to develop and publish national effluent limitations guidelines for industrial categories, including the coal mining industry, by October 18, 1973.11 But interim final guidelines for the coal mining industry were not promulgated until May 13, 1976, and even then only five

64 Comments of the Natural Resources Defense Council, Inc., on the Interim Guidelines Regulations of the Coal Mining Point Source Category, 40 C.F.R. § 434 (1975). From the May 1976 regulations it would appear that EPA has taken the position that it will terminate the responsibility of coal mining operations for water pollution abatement once the grading bond is released by terminating the NPDES permit at that point even though the text of the regulation points out that mine drainage continues and may even increase after mining operations have ceased, if proper grading and reclamation methods are not employed. 40 Fed. Reg. 19832-43 (1976). The citizen environmental groups have urged that under state laws the coal companies' responsibility for pollution abatement continues until after the revegetation bond is released, and that EPA should impose a similar responsibility during that period of time. The citizens' groups argue that EPA is thus making an arbitrary distinction between the mining process and the reclamation process whereas, in citizen groups' view, these are merely two steps in the same process—that, indeed, coal mining includes reclamation.

65 EPA Form 3320-4 (10-73). One may wonder, however, whether this kind of exemption is allowed at precisely the time when the need for regulation is greatest.

parameters of the eight originally considered were published. The difficult and time-consuming process of promulgating effluent limitations guidelines has been cited by EPA as the reason for its failure to meet the statutory deadline. Because of this failure, EPA has been forced to issue coal industry permits during this period on the basis of either regional interim effluent instructions or individual assessments of the permit applicant's discharges in an attempt to comply with the Act's December 31, 1974 deadline for the issuance of NPDES permits to industrial polluters. EPA's use of regional and individual guidelines has been slow and ineffective, and the Agency failed to comply with the December 31, 1974 deadline. On that date, 2,525 coal mines were operating in Kentucky, while only 134 NPDES coal industry permits had been issued.

Pursuant to provisions of the Water Act, two eastern Kentucky environmental groups gave notice to EPA on January 2, 1975 of their intent to file a citizen suit to compel EPA to perform its nondiscretionary duty to issue NPDES permits to coal mining operations. Simultaneously, these groups and an eastern Tennessee environmental group, Save Our Cumberland Mountains (SOCM), requested adjudicatory hearings, pursuant to EPA regulations, on several NPDES permits which had just been issued to Kentucky and Tennessee coal companies. The request alleged certain ambiguities and inconsistencies in permit conditions which, it was claimed, would substantially impede their enforcement. Among the inconsistencies cited were that the monitoring requirements were more stringent for Tennessee than for Kentucky coal mining opera-

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67 See supra notes 43-45 and accompanying text.
68 COMPTROLLER GENERAL'S REPORT TO THE SENATE SUBCOMMITTEE ON ENVIRONMENTAL POLLUTION, COMMITTEE ON PUBLIC WORKS, 94 Cong., 1st Sess. 2 (1975).
70 This figure was quoted to the authors by the Kentucky Department of Mines and Minerals, the licensing agency for all coal mines in Kentucky. Although this agency licenses all mines, its sole responsibility is coal mine safety. It has no environmental concerns.
71 This figure appeared in EPA's Public Notices about coal industry permits.
72 33 U.S.C. 1365(b) (Supp. IV, 1974).
73 The Citizens League to Protect the Surface Rights, Inc., of Letcher County, Kentucky, and the Harlan County Black Lung Association, of Harlan County, Kentucky.
74 40 C.F.R. § 125.32 (1975).
tions, and that the permits lacked a precise definition of "point source discharge" as applied to strip mining operations in both states.

Negotiations between the citizens' groups and EPA resulted in an EPA notice letter to approximately 1,800 Kentucky and 100 Tennessee coal mining operations informing them of their failure to apply for an NPDES permit and of possible penalties for such failure. Subsequently, EPA sent a second notice letter, and in August 1975, an EPA field inspection team came to eastern Kentucky to inspect mining sites. These actions caused most of the delinquent coal mining operations to apply for an NPDES permit.\(^7\)

Even though many new applications for coal permits were filed as a result of the crackdown, however, few permits were issued by EPA in response. EPA's regional offices apparently believed that the regional interim effluent limitations they had assigned to the few coal mining operations to which they granted permits would be more stringent than the national effluent limitations when they would eventually be promulgated by the EPA national office. Consequently, regional offices hesitated to issue permits to more applicants, fearing a flood of requests for adjudicatory hearings if the interim final national effluent limitations were less stringent. Enforcement of any effluent limitations would be suspended pending resolution of all these adjudicatory hearings.

The citizens' groups faced the dilemma of pressing for permits to all coal mining operations under regional interim effluent limitations and possible suspended enforcement during adjudicatory hearings, or awaiting promulgation of national effluent limitations during May, 1976, before pressing for permits. By early 1976, the groups had taken no further action.

Further aggravation of this confused situation has resulted from litigation pending in federal court to determine whether the Kentucky stream use classification scheme, promulgated by the Kentucky Department of Natural Resources and Environmental Protection as part of its water quality standards program, is contrary to Kentucky statutes and the Water Act

\(^7\) Authors' conversation with EPA officials in Washington, D.C., and Atlanta, Ga. Further observations on this problem which follow are from the same source.
because of alleged improper geographic scope. The Kentucky Attorney General and the citizens' groups seek to compel EPA to promulgate water quality standards for Kentucky which will protect all state waters under provisions of the Act giving EPA authority to approve or disapprove state water quality standards. The stream use classification is being challenged because its basis for water quality coverage is a stream map which does not depict all Kentucky waters, and is thus contrary to the Water Act and a state statute mandating protection of all waters.

3. Other Problem Areas

In addition to the problems engulfing the issuance of NPDES permits to coal companies, there are other problems in the Water Act's application to coal mining operations.

Section 208 of the Act defines EPA's responsibilities for nonpoint source pollution. Nonpoint sources regulated include "mine-related sources of pollution including new, current, and abandoned surface and underground mine runoff." Section 208 requires state and regional agencies to establish regulatory programs to control nonpoint source pollution. Subject to EPA approval, each state must designate areas with "substantial water quality control problems" and must operate "a continuing areawide waste treatment management planning process." Although the Act directs states to control nonpoint source pollution including coal mining operations, it does not establish any substantive requirements for how this should be accomplished. Apparently the "carrot-on-a-stick" approach is contemplated by providing for federal funding of state nonpoint source control programs.

Nonpoint source pollution also includes drainage from ag-

\footnotesize

\textsuperscript{76} Kentucky ex rel. Hancock v. Train, Civ. No. 7416 (E.D. Ky., filed June 25, 1974).
\textsuperscript{77} 33 U.S.C. §§ 1313(a)(3)(c), 1313(b) (Supp. IV, 1974).
\textsuperscript{78} 401 KAR § 5:035 (1975).
\textsuperscript{79} KRS § 224.005(19) (Supp. 1974).
\textsuperscript{80} 33 U.S.C. § 1288 (Supp. IV, 1974).
\textsuperscript{81} Id. § 1288(b)(2)(G).
\textsuperscript{82} Id. § 1288(b)(2)(G).
\textsuperscript{83} Id. § 1288(a)(2).
\textsuperscript{84} Id. § 1288(b)(1).
\textsuperscript{85} Id. § 1288.
ricultural fields where large amounts of pesticides and fertilizers are used; drainage from large animal feed lots; some drainage from strip mines; and drainage from major construction sites. Although this drainage may be more difficult to control than drainage from point sources, control is not impossible. Watershed research studies have confirmed that streams can be protected from nonpoint source pollution if sufficient amounts of healthy vegetation are allowed to remain as "living filters" or "buffer strips" between the pollutant source areas and the receiving stream, land disturbance is prohibited in minor stream channels, disturbed soils are immediately mulched and reseeded or sodded to protect against sheet erosion, land disturbances are limited or forbidden during the dormant winter season when the buffer strips are largely ineffective to protect against erosion, and silt and water retention ponds, perhaps with chemical treatment facilities, are built on smaller receiving tributaries where necessary to protect a larger receiving stream from silt or other pollutants not retained by the other watershed management techniques.

Section 306 of the Act requires EPA to promulgate effluent standards for "new sources," defined as any source whose construction began after EPA publication of proposed effluent limitations for that industry. Effluent limitations for the new sources will require "the greatest degree of effluent reduction . . . achievable through application of the best available demonstrated control technology." The "new source" standards will usually be as stringent as the 1977 "best practicable technology currently available" but may be less stringent than the

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86 Id.


Kentucky uses all of the techniques to some degree in its strip mine reclamation program except forbidding winter mining, but the condition of the streams which drain the coal fields demonstrates that they are largely unsuccessful. Surface Mine Water Quality Control in the Eastern Kentucky Coal Fields 16 (Appalachian Regional Commission Pub. No. 71-66-TS, 1974).


89 Id. § 1316(a)(2).

90 Id. § 1316(a)(1).
1983 "best available technology economically achievable" standards.

Some "new source" standards for the coal mining industry were promulgated on May 13, 1976. Coal preparation plants constructed after May 13, 1976, will be allowed no pollutant discharge. Although coal storage areas, refuse storage areas and coal preparation plant ancillary areas constructed after May 13, 1976, will be subject to limitations, there were no "new source" standards for acid or ferruginous mine drainage or alkaline mine drainage.91

Further complications are certain to arise under section 511 of the Water Act, which exempts EPA from the environmental impact statement requirements of the National Environmental Policy Act for all actions except the issuance of permits to new sources.92 EPA has proposed regulations for the preparation of environmental impact statements for "new source" NPDES permits which require that such statements consider any secondary, nonwater environmental effects of the new source as well as the effect of the effluent it discharges.93 It is unclear, however, whether the issuance of an NPDES permit to a new coal mine is "a major Federal Action significantly affecting the quality of the human environment."94 Arguably, the intent of the Act is for EPA to write an impact statement for every "new source" permit it issues, regardless of whether any individual permit is a major federal action within the meaning of the National Environmental Policy Act. If this absolute position is not adopted by EPA, however, the proposed physical dimensions and the projected life of a new coal mine are two factors which should be considered in determining whether an environmental impact statement will be required. Whenever a proposed mining operation of any size or duration

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92 Id. EPA anticipates that new source performance standards for coal mines will be proposed on or before October 17, 1976.
95 The National Environmental Policy Act, 42 U.S.C. § 4321 et seq. (Supp. IV, 1974), requires consideration of a broad range of environmental factors when any federal agency proposes "a major federal action significantly affecting the quality of the human environment." It requires the agency to prepare an environmental impact statement detailing the environmental impact of the program.
will have a significant effect on the quality of the human environment, an environmental impact statement should be prepared. It will be extremely important for EPA to have a set of guidelines to use in making that determination.

Even though the primary means of achieving clean water under the Water Act is the NPDES program, section 404 of the Act reserves to the Army Corps of Engineers the exclusive regulation of all activities involving the discharge of dredge and fill material. This program is not meant to be assumed by the states. Historically, the Corps has performed this task under the provisions of the 1899 Refuse Act, not for environmental purposes, but to prevent obstruction of interstate commerce by regulating the structures placed or built, and substances discharged into navigable waterways which would impede the passage of commercial traffic. Under the 1972 Act's provisions, the Corps and EPA will work together. EPA guidelines must be considered by the Corps in granting permits for dredge and fill operations, and EPA has a veto over any section 404 permit issuance.

Under its 1899 Refuse Act program, the Corps limited its activities to waters which were navigable in fact, but the 1972 Amendments to the Federal Water Pollution Control Act expanded the geographical extent of federal jurisdiction to "the waters of the United States." This broadening of jurisdiction extends to the Corps' section 404 permit granting activities as well. Environmentalists successfully challenged the Corps' early attempt to limit its authority under section 404 to waters navigable in fact, and on March 27, 1975, a federal court directed the Corps to extend its regulation of dredge and fill operations under section 404 to all waters of the United States and to revise its regulations accordingly.

The Corps' interim final regulations, revised to conform to the court decision, were published on July 25, 1975, and be-

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96 Id.
97 33 U.S.C. § 1344(c) (Supp. IV, 1974).
98 Id. § 1362(7).
99 Id. § 1344(a).
They expand the Corps' authority in three phases over the next 2 years. Phase I, effective July 25, 1975, extended the Corps' regulation of dredge and fill operations from traditional navigable waters to contiguous or adjacent wetlands. Phase II, effective July 1, 1976, will further expand jurisdiction into primary tributaries of navigable waters of the United States, lakes, and the contiguous or adjacent wetlands. After July 1, 1977, the Corps will extend its authority to other waters generally up to the headwaters in Phase III.

It appears that the section 404 permit program will be a more meaningful tool in the control of coal mining discharges upon implementation of Phase II on July 1, 1976. Most coal mining operations in Appalachia are located on primary tributaries and small streams, and the few that are located on traditional navigable waters are generally barge or coal loading facilities. But some coal mining companies actually dredge the stream bottoms to recover coal fines which have settled there over time. Others, particularly underground mines with portals located at or near streams, often cause filling of the streams through expansion of the operation in the narrow, steep Appalachian valleys and hollows. Section 404 permits may be required by the Corps for these activities by coal companies.

Congress, in drafting the 1972 Amendments to the Federal Water Pollution Control Act, recognized that one of the most important uses of the nation's waters is navigation. To protect that use, the Water Act requires the Corps of Engineers to review all proposed NPDES permits prior to issuance by EPA for discharges that may substantially impair navigation. The Corps may prescribe additional requirements for inclusion in the NPDES permit or may deny the permit altogether if it believes such conditions cannot be met by the discharger. Aggressive Corps participation in the NPDES program for permits issued to coal mining operations in Appalachia is especially important. Underground and strip mining activities in the watershed regions of several Corps water resource projects have caused serious environmental problems, including

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101 Id.
104 40 C.F.R. §§ 125.21(c), 125.22(b) (1975).
sedimentation in streams and reservoirs (at one reservoir up to 6 feet), deterioration of water quality by acid mine drainage, and degradation of the projects’ aesthetic qualities.

To protect the substantial public investment in those Corps projects and to prevent the creation of polluted conditions in presently unthreatened project watersheds where mining is contemplated, the Corps should look closely at all proposed permits for mining companies to determine whether the resulting mine pollution might impede navigation or endanger one of its projects. Where the Corps finds there is a danger, it should include conditions in the permit which will provide adequate protection of its projects. In initial coal mining permits, the Corps has imposed a special responsibility on coal companies to remove all material resulting from their discharges that impairs navigation, or to reimburse the Corps for removal of such material from a waterway in an area where the Corps has a maintenance dredging program or a proprietary interest.

Although enforcement of such a condition may be difficult, it is essential to ensure protection of navigable waterways and Corps projects.

B. The 1899 Refuse Act

The 1899 Refuse Act prohibits discharging “any refuse matter of any kind or description whatever” into navigable waters where anchorage or navigation might be injured. This Act created a permit system administered by the Army Corps of Engineers, but until 1960 it was interpreted to apply only to discharges obstructing navigation. Two Supreme Court decisions in the 1960’s, however, construed the statute to apply to any industrial waste even though it did not obstruct navigation literally. As a result of those decisions and pursuant to a Presidential directive, the Corps established a permit program in conjunction with EPA in 1970, requiring all industries

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106 EPA Public Notices of NPDES Permit Determinations.
discharging into navigable waters to apply for permits. The program vested final authority on questions of water quality impact to the EPA and on navigation and anchorage effects to the Corps. Before it was implemented, however, it was enjoined by a federal court on the ground that the Corps' regulations did not require the environmental impact statements required by the National Environmental Policy Act. The program remained in limbo until the 1972 Amendments to the Federal Water Pollution Control Act were approved.

Although the 1972 Amendments did not repeal the Refuse Act, they replaced it as the primary tool for enforcing water quality standards. Section 404 requires the Corps to regulate the disposal of dredge and fill material only, a severe cutback of its original mandate to control all industrial discharges. A remnant of the Refuse Act, section 10, still authorizes a Corps of Engineers regulatory permit program for structures to be built or work to be performed in traditional navigable waters of the United States. That also is an important tool for controlling pollution in coal mining operations that have barges or coal loading facilities on navigable rivers. Moreover, the section 10 permits should help control disposal of dredge and fill material by coal mining operations until Phase II of the section 404 permit system becomes operative on July 1, 1976. The states participate in this Corps program by certifying section 10 permits.

III. CURRENT STATE REGULATION

As a result of differences in their governmental structures, Kentucky and Tennessee vest different administrative agencies with responsibility for carrying out their pollution control and abatement programs even though the objectives of the two programs are largely identical. Although these agencies have a variety of legal tools available for combating pollu-

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11 Id.
15 KRS § 224.120 (1972); TENN. CODE ANN. § 70-324 et seq., § 58-1540 et seq. (Supp. 1975).
tion, underfunding, understaffing, and lack of expertise have prevented effective enforcement of those laws.\textsuperscript{116}

Similar abatement laws, agencies, and enforcement problems are found in most states where coal is mined. A careful study of the regulatory systems of Kentucky and Tennessee is useful for guidance.

A. Kentucky

Regulation of coal mine water pollution in Kentucky is the responsibility of two divisions in the Department of Natural Resources and Environmental Protection. The Division of Reclamation regulates water pollution from strip mining operations\textsuperscript{117} and will regulate water pollution from underground mines in the future.\textsuperscript{118} The Division of Water Quality regulates coal preparation plants and coal washing facilities.\textsuperscript{119} Additionally, the Division of Water Quality certifies EPA's NPDES permits issued to all coal mining operations (mines and preparation plants) and Corps of Engineers' Refuse Act section 10 permits issued to coal loading facilities on Kentucky's navigable waters.\textsuperscript{120}

1. The Division of Reclamation

This Division's regulations impose water quality requirements upon strip mining operations to control pH, iron, settleable solids and suspended solids.\textsuperscript{121} Treatment technology required includes constructing treatment facilities consisting of collection basins, water retarding structures, and silt dams before beginning mining operations; using soda ash briquets or limestone beds for pH and iron control; prohibiting the depos-

\textsuperscript{116} DESIGN OF SURFACE MINING SYSTEMS IN EASTERN KENTUCKY, 8, 9, 63, 64 (Appalachian Regional Commission, 71-68-T1, 1974).
\textsuperscript{117} 402 KAR § 1:025-1:060 (1975).
\textsuperscript{118} 402 KAR § 1:001 (Proposed 1975).
\textsuperscript{119} 401 KAR § 5:005 et seq. (1975).
\textsuperscript{120} DIVISION OF WATER QUALITY, KENTUCKY DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION, PROGRAM PLAN, 5, 6, 25 (1974) [hereinafter cited as PROGRAM PLAN].
\textsuperscript{121} "Solids" include any material, such as silt, which is solid rather than mineral or acidic in nature. "Settleable solids" tend to settle on the bottom of the stream quite rapidly, while "suspended solids" remain suspended in water for hours or even days before settling on the bottom of the stream.
its of spoil material within 50 feet of each side of the channel of intermittent streams; prohibiting the sudden release of large volumes of water onto outer slopes of spoil banks; and prohibiting discharge into underground mine workings. The permissible pH range is 6.0 to 9.0. The maximum allowable concentration of iron is 7 mg/l. No discharges may contain any settleable solids, nor more than 330 mg/l of suspended solids except "during a precipitation event," in which case suspended solids may not exceed 2,200 mg/l.

Another regulation attempting to prevent siltation from strip mining operations imposes sediment control planning requirements on the operations before the issuance of a permit. This regulation provides that the Division may require the removal, backfilling, and grading of silt dams after active mining has been completed. The sediment contained in the dams and the material composing the dam itself are removed to another location and seeded. The Division has discretion to allow exemptions from this regulation.

Enforcement theoretically includes routine water quality analyses conducted by Division field inspectors as part of their mine inspection duties, but unless there is a gross violation of the water quality criteria, generally revealed by citizens' complaints, this significant portion of the regulation goes largely unchecked and unenforced. Mine Inspection Reports used by field inspectors contain sections for the results of these water quality analyses, but few of the Mine Inspection Reports on file in the Division office contain the results because the analyses are infrequently made.

122 402 KAR § 1:055 (1975).
123 Id. In comparing Kentucky's effluent limitations with the EPA national effluent limitations, it is interesting to note that although their limitations on pH and iron are the same, Kentucky's maximum allowable suspended solids is almost five times as high as the daily average maximum allowance set by EPA. Furthermore, during "precipitation events" (which are not defined in the regulation), Kentucky's suspended solids limit is more than 30 times EPA's limits. In its initial NPDES permits issued to coal companies, EPA Region IV did not allow a higher suspended solids concentration during rainfall; the only special rainfall provision was one that allowed the company to bypass its treatment facility during a once-in-10-years' storm.
124 402 KAR § 1:060 (1975).
125 402 KAR § 1:060(1)(6) (1975).
126 KRS § 350.050(1) (Supp. 1974).
127 Authors' personal observations of files of the Kentucky Department of Natural Resources and Environmental Protection, Division of Reclamation.
Division officials seldom monitor or inspect the silt dams either. Consequently, when the dams fill with silt, which rapidly occurs during mining and especially in winter, the sediment from the operation flows directly from the mining site over the top of the sediment-filled silt dam into the receiving stream. Moreover, as new discharges occur and flow over these loaded silt dams, they cause sediment deposited earlier in the silt dam to escape and enter the receiving stream. There are no controls on any other minerals even though a study has shown that sulfate, calcium, magnesium, aluminum, zinc, and manganese greatly increase following coal mining in Kentucky and continue to increase for at least 2 years after active mining has ceased.

Watershed research studies have shown that streams can be better protected from coal mining pollutants by limiting or prohibiting land disturbances during the dormant winter season when plant life buffer strips between the coal mining operation and the stream are largely ineffective. Kentucky has no such restriction on winter mining.

The regulations proposed to control the surface effects of underground mining operations are almost a carbon copy of the water quality regulations for strip mines, particularly as they pertain to water quality standards. The same limitations imposed on strip mines are proposed for underground mining operations with surface discharges. Although the surface effects of underground mining will be regulated for the first time in Kentucky, it is feared that the section of the proposed regulation granting a partial exemption from the regulation's provisions based on broad criteria might be used by the coal mining industry to avoid the regulation once it becomes final.

Monitoring of the surface effects of underground mines by the Division's strip mine inspectors will create a substantial

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128 Telephone conversations between authors and Division of Reclamation officials.
129 W. Curtis, Chemical Changes in Streamflow Following Surface Mining in Eastern Kentucky 1 (1972); supra notes 13-15 and accompanying text.
131 402 KAR § 1:055 (1975).
132 401 KAR § 1:001 (Proposed 1975).
133 Id.
problem of personnel management for the Division. Although Division policy requires inspection of every strip mine once every 7 days, a recent study indicates that strip mines are actually inspected only once every 17 days, and surprisingly, some inspectors visit their respective mines only once every 42 days.\(^3\) If these overworked Division of Reclamation inspectors must inspect underground mines also, it is questionable how thorough the monitoring and enforcement of water quality criteria can be at either strip or underground sites.

2. The Division of Water Quality

The only coal mine water pollution regulated by the Division of Water Quality is pollution from coal preparation plants.\(^1\)\(^3\) These activities are undertaken by mining companies to improve and standardize the quality of the coal by the process of “coal washing,” which removes fine suspended solids from the coal. Pollution from coal washing is commonly called “black water,” and is treated by the use of a settling device such as a lagoon or by returning the material to a worked-out portion of the mine. When the lagoons eventually fill up, the material must be removed and placed on refuse piles in such a manner that it will not wash into a stream.

Black water is also disposed of, although illegally, by diverting it directly into streams without first using settling ponds or lagoons. Prosecution by the Department of Natural Resources and Environmental Protection for these violations has increased recently, undoubtedly due to citizen complaints.\(^1\)\(^3\) Even a small coal washer without adequate control measures can blacken a major stream for a hundred miles or more. The Division’s primary strategy for the control of black water is to review plans and specifications for new washer installations and to inspect the washers and the disposal areas.\(^1\)\(^3\)

This Division also certifies EPA’s NPDES permits issued

\(^1\)\(^3\) CENTER FOR SCIENCE IN PUBLIC INTEREST, THE ENFORCEMENT OF STRIP MINING LAWS IN THREE APPALACHIAN STATES: KENTUCKY, WEST VIRGINIA AND PENNSYLVANIA 25 (CSPI Energy Series VIII, 1975) [hereinafter cited as Enforcement of Strip Mining Laws].

\(^1\)\(^3\) PROGRAM PLAN, supra note 120.

\(^1\)\(^3\) Kentucky Department of Natural Resources and Environmental Protection Publication, News, Features and Schedule of Events.

\(^1\)\(^3\) PROGRAM PLAN, supra note 120.
to Kentucky coal operations, but since few permits have been issued to Kentucky coal operations and since Kentucky has not yet assumed the NPDES permit issuance function from EPA, it is too early to speculate on what role this Division might play in the overall control of coal mine water pollution.

3. *Suggestions for Improvements in the Kentucky System*

Siltation of Kentucky’s streams is perhaps the worst environmental problem encountered in its coal fields. Thus, it is environmentally unsound for Kentucky to allow strip mining during the dormant winter months when no effective plant life buffer strips exist. Technical water quality studies show that winter mining contributes vast amounts of sedimentation to Kentucky streams; strip mining during such periods should be prohibited.

Secondly, no authority can be found to support the Kentucky regulation permitting a discharge containing 2,200 mg/l of suspended solids during a rainfall. Use of the reclamation techniques outlined supra and treatment by silt dams would reduce sediment runoff and would justify a reduction of the 2,200 mg/l maximum allowable concentration for suspended solids.

Thirdly, strong statutes are of little value if not enforced. Studies show that Kentucky has a dearth of mining inspectors, that they are underpaid, lack expertise, and are responsible for too many mines. These are formidable obstacles to adequate enforcement of the laws.

Fourthly, exemptions and partial exemptions based on agency discretion weaken the regulatory scheme. Finally, for Kentucky to assume the NPDES permit program, it must strengthen its penalty provisions; guarantee broad public participation in the issuance of permits or modifications; set out succinct terms, conditions, and duration in its permits; im-

138 *Id.* at 19.
139 *Supra* note 86.
140 *Supra* note 86 and accompanying text.
142 See *supra* note 132 and accompanying text.
prove agency facilities; and increase the level of expertise of its personnel.\textsuperscript{143}

B. Tennessee

In Tennessee underground coal mine and strip mine pollution require different analyses because they are regulated separately by state agencies. No state statute governs the surface environmental effects of underground mines, but one does specifically regulate strip mining.\textsuperscript{144} The state water pollution control statute\textsuperscript{145} is applicable to water pollution caused by both types of mining.

1. Underground Mine Pollution

The Tennessee Water Quality Control Act makes it unlawful for any person to alter the “physical, chemical, radiological, biological, or bacteriological properties” of any stream without first receiving and operating under the conditions of a discharge permit issued by the Tennessee Commissioner of Public Health.\textsuperscript{146} The permit does not allow a person to make a discharge that will pollute “either by itself or in combination with the activities of others.”\textsuperscript{147} “Pollution” is defined to include harm or potential harm to the public health, safety, or welfare; to the health of animals, birds, fish, or aquatic life; or to the waters themselves to make them substantially less useful for domestic, municipal, industrial, agricultural, recreational, or other reasonable uses.\textsuperscript{148}

Most underground coal mines have surface runoff, or sometimes even pumped runoff from inside the mine, that flows into Tennessee streams. Since this alters the chemical and biological properties of the stream, the Water Quality Control Act requires each underground mine to obtain a discharge permit before mining begins. The Division of Water Quality Control of the Tennessee Department of Public Health, however, which is responsible for enforcement of the Water Quality

\textsuperscript{143} See supra note 55.
\textsuperscript{144} TENN. CODE ANN. § 58-1540 et seq. (Supp. 1975).
\textsuperscript{145} Id. § 70-324 et seq.
\textsuperscript{146} Id. § 70-330(b).
\textsuperscript{147} Id. § 70-330(e).
\textsuperscript{148} Id. § 70-326(11).
Control Act, has not established a system for checking underground coal mines to ensure that they obtain permits. Only a handful of companies which operate underground mines have applied for discharge permits. Upon application for a permit, the Division inspects the company's mining operation and issues a permit setting limitations and conditions for future discharges.

When a Water Quality inspector observes gross pollution from an underground mine or when a citizen asks for an inspection of a particular mining site, the Division usually inspects the site and requires the company to apply for a permit and submit a plan for runoff control. The Division took legal action in 1975 against several underground mining companies which did not abate their pollution after a warning by the Division.

The Division's failure to create a program for locating underground mines and requiring all to obtain permits is a result of limited manpower and budget. Underground mining companies which have not obtained discharge permits are clearly in violation of Tennessee law, and citizen interest or a lawsuit by a citizens' group could force the Division to devote more attention to this problem.

2. Strip Mine Pollution

The Water Quality Control Division has a well-organized program for regulating pollution from coal strip mines. The Tennessee Surface Mining Law requires a strip mining company to obtain a discharge permit from the Division of Water Quality Control before the company can receive a surface min-

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1. Authors' conversation with Division of Water Quality Control officials.
2. Id.
3. E.g., State v. Highland Coal Co., No. A-5049-a (Ch. Ct., Davidson County, Tenn., Oct. 10, 1975). The State has also brought an enforcement action against Clear Creek Coal Company.
5. The Water Quality Control Division began issuing permits to strip mining companies in 1973 after several citizens' groups filed suit against the Division for failure to issue the permits. The court issued a writ of mandamus requiring the Division to begin taking action on permit applications from strip mining companies. State ex rel. Save our Cumberland Mountains v. Fowinkle, No. A-2194-A (Ch. Ct., Davidson County, Tenn., Nov. 2, 1973).
ing permit from the Division of Surface Mining of the Tennessee Department of Conservation. Thus, a water pollution discharge permit is a specific prerequisite to the initiation of a legal strip mining operation in Tennessee. A number of illegal wildcat miners operate in Tennessee without either a surface mining permit or a discharge permit, but most of the State's 150 or more strip mining companies obtain both.

The Water Quality Control Division follows a pre-mining routine before issuing a discharge permit to a strip mining company for a particular site. It requires each company to submit detailed engineering plans for the control of drainage at each of its proposed mining sites, which must be drawn according to Division guidelines. The Division's inspectors conduct a pre-mine inspection at each of the company's mining sites to ensure that the company's plans for controlling its drainage will really work.

The Water Quality Control Division examines the permit application and engineering plan for the mine in detail, and frequently requires some additional information or clarification from the mining company. If the plan does not provide adequate protection for the unique geography or geology of a mining site, the Division often requires the company to delete cer-

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155 The discharge permit application provides basic information about the location of the company's proposed mining sites, the topography of the sites, and the streams that will be affected by mine drainage. The mining plan and accompanying maps, usually prepared by a consulting engineer, describe the exact mining method to be employed and the detailed techniques for the control of drainage from the mining site. Typically, an engineering plan describes the spoil handling and grading techniques that will be employed, the temporary and ultimate location of the spoil, the location and structure of the silt dams, the location and structure of any drainage ditches or culverts, any other erosion control measures that will be used, the method of handling toxic material, the methods of revegetation and stabilization of silt structures to be used after mining is completed, and the monitoring method and location to be used both during and after mining. The plans also list precise figures for the percent of soil expansion, the average bench width, the average cut width, the average fill width, the bench length, the average coal seam thickness, and the average overburden thickness to be removed. They also discuss the geological characterization of the overburden, give precise dimension figures for all silt dams and rock drainways, illustrate the silt dams and rock drainways vividly with sketches, contain a detailed monitoring proposal, and list the types of grasses and trees which will eventually be used in revegetation.
156 Id. § 70-329(g).
157 Id. § 70-329(k).
tain areas from mining or to redraw its plans entirely.  

After completion of these preliminary steps, the Commissioner of Public Health, upon the Division's recommendation, usually issues the company a discharge permit containing restrictions on the amounts of certain pollutants that may legally be contained in its discharges. A typical permit is valid for 1 year. The permit requires that all treatment and retention facilities, silt traps for example, be stabilized at the conclusion of mining to prevent silt or other material from entering the stream at a future date. This condition presumably imposes a continuing responsibility on the company to prevent post-mining pollution of streams. The permit incorporates by reference any special conditions imposed by the Division in previous correspondence with the company. It further states that the company will be liable for all fish it kills and all public or private nuisances it creates, notwithstanding its compliance with all the other conditions of the permit. A failure to adhere to the mining plan approved by the Division constitutes a violation of the permit.

The foregoing requirements of the Water Quality Control Division cannot be viewed in isolation from the requirements imposed on the same strip mining companies by the Division of Surface Mining under the provisions of the Tennessee Surface Mining Law. Under this statute, the Commissioner of Conservation and his Division of Surface Mining are responsible for regulating the manner of strip mine operations and requiring reclamation and revegetation after mining is completed. The statute defines "reclamation" to include the construction of water control facilities to control current or future water pollution. The Commissioner, who generally has broad discretionary power to approve or disapprove applications for surface mining permits, is required to deny an application if

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158 Authors' own examinations of Division of Water Quality Control files.
159 Typical restrictions include: (1) pH—not less than 6.0 and not more than 9.0; (2) settleable solids—no more than 1.0 mg/1 (as measured by the standard 1 hour Imhoff cone test); (3) suspended solids—no more than 100 mg/1; (4) iron no more than 1.5 mg/1; (5) sulfate—no more than 1,400 mg/1; and (6) manganese—no more than 10.0 mg/1.
161 Id. § 58-1541(0).
162 Id. § 58-1543(0).
there is probable cause to believe that some aspect of the mining operation will result in a violation of the state’s water quality standards. He must also deny an application if he finds that the overburden cannot be controlled and will cause landslides, depositing of sediment on stream beds, or water pollution, or if he finds that any part of the operation would constitute a hazard to a stream, lake, reservoir, or water well. The company is required to post a performance bond with the Commissioner in the amount of at least $1,000 for each acre that will be affected by the mining operation, to be released only after reclamation and revegetation have been completed by the company.

Each company is required to submit a mining and reclamation plan, which must be approved by the Commissioner before a surface mining permit can be issued to the company. In practice, most companies fulfill this requirement by submitting to the Surface Mining Division the same mining and reclamation plan they have submitted to the Water Quality Control Division with additional information required by the Surface Mining Division. Like the officials of the Water Quality Control Division, inspectors from the Surface Mining Division make a pre-mining inspection to determine whether the company can carry out its proposed mining plan in a lawful manner.

Several provisions of the Surface Mining Law and the regulations promulgated by the Commissioner pursuant to this statute are intended to help minimize coal mine water pollution. A company is not allowed to strip mine on slopes in excess of 28 degrees unless it agrees not to deposit any overburden downslope from the coal seam. When the slope is less than 28 degrees, the company may place spoil no farther than 50 feet downslope from the cropline. Both requirements are designed...

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163 Id. § 58-1544(d).
164 Id. § 58-1544(e).
165 Id. § 58-1544(g).
166 Id. § 58-1546.
167 Id. § 58-1547(a).
168 Id. § 58-1544(c).
169 Id. § 58-1544(i).
170 RULES AND REGULATIONS OF THE TENNESSEE DEP’T OF CONSERVATION, ch. 0400-3-7-.03(2)(c)(1975)[hereinafter cited as RULES AND REGS.]. It is estimated that this 50
to minimize soil erosion and landslides. The companies must bury all acid-producing materials, such as pyrite or shale, and must cover the faces of all coal seams and all exposed auger holes with available spoil.\footnote{Id. § 58-1547(a)(A)(1)(Supp. 1975).} They must provide silt control to control soil erosion, damage to adjacent lands, and any type of water pollution both during and after the mining operation.\footnote{Id. § 58-1547(a)(A)(3).} In relatively flat areas, the companies must regrade the land after mining to approximately the original contour and eliminate any spoil piles or water-collecting depressions.\footnote{Id. § 58-1547(a)(A)(6).}

The reclamation, regrading, and revegetation provisions of the statute are also designed to minimize coal mine water pollution. Regrading and reshaping of any acre of land disturbed by the strip mining operation must be completed within 6 months following the initiation of soil disturbance\footnote{Id. § 58-1547(a)(A)(8).} or within 3 months, weather permitting, after completion of the removal of the coal,\footnote{Id. § 58-1547(c).} whichever is first. The company's revegetation plan must be designed to achieve rapid permanent soil stabilization through the planting of trees, shrubs, grasses, or legumes.\footnote{Id. § 58-1548(a).} The regulations provide that mixtures of certain plant species must be planted at certain times of the year because their chances for survival are greatest during that season; they also specify the amount of mixture per acre which must be planted.\footnote{Rules and Regs., ch. 0400-3-7-.04(5)(j).}

Other sections of the Regulations which limit coal mine water pollution are those dealing with haul roads,\footnote{Id. .02.} breakthroughs to underground mines,\footnote{Id. .03(1)(c).} limitations on mining within 100 feet of a stream,\footnote{Id. .03(1)(d).} silt dams,\footnote{Id. .03(1)(e).} landslides,\footnote{Id. .03(2)(b).} excessive foot limit will force companies to retain about 90 percent of the spoil uncovered during the mining operation on the bench.
downslope spoil dumping, prohibition of mining within 25 feet of a natural drainway, head-of-hollow fills, water diversion ditches and water impoundments in flat areas, and use of fertilizer and mulch during revegetation. To varying extents, these regulations are all helpful tools in the fight against coal mine water pollution.

3. Orphan Mine Pollution

Orphan mine pollution represents a particularly difficult problem in water quality control. Orphan mines are those abandoned by their former operators but which continue to pollute nearby streams. Legal responsibility for abating this pollution has not been clearly assigned.

Save Our Cumberland Mountains (SOCM), a citizens' environmental group, has filed a formal petition with the Tennessee Water Quality Control Board asking it to decide who has legal responsibility for abating orphan mine pollution, and the petition has been referred to the Tennessee Attorney General's office for an advisory opinion. Pollution by an orphan mine discharge is clearly illegal because no permit has been issued to allow the discharge. In its brief to the Board, SOCM argued that the landowner and the coal company which abandoned the mine are responsible for the pollution. The Board is expected to rule in 1976.

The Tennessee Department of Conservation announced in 1975 that it will initiate a strip mine reclamation program

180 Id. .03(2)(c).
181 Id. .03(2)(d).
182 Id. .03(2)(e).
183 Id. .03(2)(f).
184 Id. .03(3)(e).
185 Id. .03(3)(f).
186 Id. .04(5)(f).
187 Id. .04(5)(g).
188 Petition for Save Our Cumberland Mountains, Inc., at 3, to the Tennessee Water Quality Control Board (December 1974).
using the permit fees collected from strip mining companies.\textsuperscript{194} The Commissioner of Conservation, who administers this reclamation fund, indicated that his top priority will be to reclaim the orphan mines which cause the worst water pollution problems.\textsuperscript{195}

4. \textit{Suggestions for Improvement in the Tennessee System}

An important omission of the Tennessee system for regulating coal mine water pollution is its failure to regulate underground mine pollution systematically. The Water Quality Control Act applies to underground mines,\textsuperscript{196} but the Water Quality Control Division is remiss in failing to prosecute underground mining companies which are discharging pollutants into Tennessee streams without discharge permits. To supplement the Division's efforts, the Tennessee legislature may wish to follow Kentucky's lead by specifically regulating the surface environmental effects of underground mining.

The Water Quality Control Division has also failed to assign legal responsibility for orphan mine pollution.\textsuperscript{197} The Water Quality Control Act contemplates that wherever there is pollution, there is a party responsible for abating it.\textsuperscript{198} The Division may want to assist this cleanup effort with public funds, or the legislature could enact a special tax on the coal industry specifically to abate orphan mine pollution. The Department of Conservation at least should advise the Division of Water Quality Control concerning its reclamation expenditures from its strip mine reclamation fund. In the final analysis, however, the parties responsible for the pollution should bear the greatest responsibility for the abatement effort.

In its regulation of active mines, the Water Quality Control Division has exhibited a degree of professionalism not found in the Surface Mining Division and has reorganized the pre-mine planning process. The effect of this is that mining companies are forced to consider the effect of their mining on

\textsuperscript{194} \textsc{Tenn. Code Ann.} § 58-1551 (Supp. 1975).
\textsuperscript{195} \textit{State to Begin Strip Mine Reclamation in Mid-April}, Knoxville Journal, December 11, 1975, at 1, col. 3.
\textsuperscript{196} \textsc{Tenn. Code Ann.} § 70-330(b) (Supp. 1975).
\textsuperscript{197} \textit{See supra} note 196.
\textsuperscript{198} \textsc{Tenn. Code Ann.} § 70-326(11) (Supp. 1975).
water quality in advance and to take necessary steps to avoid polluting nearby streams. The regulatory system is far from perfect, however. The Division's monitoring efforts are woefully inadequate, and since many mining company officials do not pay close attention to the engineering plans prepared by their consulting engineers, it becomes even more important that the Division initiate a better program of monitoring mines which have discharge permits. Once EPA's monitoring program under the NPDES system is fully operational, perhaps the Division will receive some assistance from EPA officials on monitoring and enforcement.

The Department of Conservation and its Surface Mining Division have adequate legal tools to provide substantial assistance in the regulatory effort to abate coal mine water pollution, but the Surface Mining Law vests such tremendous discretion in the Commissioner of Conservation and in Division officials that the regulatory effort is almost totally at their mercy. A lack of highly trained inspectors and an almost total failure to bring enforcement actions against violators makes the Division of Surface Mining a rubber stamp for the mining companies.

There is often a lack of regulatory coordination between the Water Quality Control Division and the Surface Mining Division. Officials of the two Divisions sometimes give a mining company conflicting advice, and company officials are understandably confused by this inconsistency, which makes it almost impossible for either Division to enforce its order. Officials of the two Divisions must strive to coordinate their efforts more closely. If possible, pre-mine inspections should be made together by officials from the two Divisions so they can jointly decide what special precautions must be taken at a mining site.

It has been suggested that the two Divisions would be better coordinated and more efficient if the legislature reorganized the system of state environmental regulation so that both Divisions were in the same state department, responsible to the

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193 Authors' conversation with Division of Water Quality Control officials.


201 In State v. Dixie Pine Coal Co., No. 46496 (Ct. Gen. Sess., Campbell County, Tenn., Oct. 16, 1974), the two Divisions had differing positions on the pre-mine planning responsibilities of the Dixie Pine Coal Company.
same department head. Although this is logical, when one regulatory agency is not aggressive about enforcement, another more aggressive agency with overlapping responsibilities, as exists between the Divisions of Water Quality and Surface Mining, may serve as a check on the first agency. Many Tennessee environmentalists believe that the Water Quality Control Division serves as a check on the Surface Mining Division, and would be skeptical about placing both Divisions under the same state department.

Many of the suggested changes will require additional funds for the two agencies. Since the tremendous demand for coal will undoubtedly make the coal industry grow and flourish in Tennessee in the next two decades, the Tennessee legislature should make an intensive study of regulatory needs in this area, and should enact additional legislation and appropriate additional funds to remedy this serious environmental and economic problem. Unless the Tennessee legislature makes a sincere commitment to a forceful, coordinated regulatory effort now, the public will pay the costs of coal mine water pollution abatement in the future.

IV. Conclusion

Like many regulatory schemes, the scheme to abate coal mine water pollution is a joint federal-state effort. The federal program is deficient, but hopefully by the end of 1976 almost all coal companies in the nation will have received NPDES permits from EPA. At the state level, regulatory agencies are more aware of the problems but are plagued by a lack of expertise, a shortage of personnel and funds, a lack of leadership, and, to a degree, inadequate statutes and regulations. The Tennessee Water Quality Control Division and, very recently, the Kentucky Department of Natural Resources and Environmental Protection offer hope that some state regulatory agencies can make significant accomplishments in the field of water pollution abatement despite these inadequacies.

The federal and state laws and regulations which currently regulate coal mine water pollution are generally adequate legal tools to accomplish the regulatory goals. With a few minor legislative adjustments this would certainly be true in Kentucky and Tennessee. Clear commitments are needed by Congress and the state legislatures to fund regulatory agencies ade-
quately, and by the agencies to hire qualified personnel and give them the necessary training. Because of the federal government's broad tax base, it must assist the states in funding some of their regulatory programs and in training their personnel.

Finally, the regulatory agencies must give a high priority to the abatement of coal mine water pollution. Since coal will be the nation's dominant source of energy for the next decade, it is important that government agencies give the coal industry and its attendant environmental problems the attention they deserve.