UNITED STATES

DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

A SUMMARY OF SELECTED PUBLICATIONS, PROJECT ACTIVITIES AND DATA SOURCES RELATED TO HYDROLOGY IN THE WARRIOR AND PLATEAU COAL FIELDS OF ALABAMA

By Robert E. Kidd and Thomas J. Hill

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A SUMMARY OF SELECTED PUBLICATIONS, PROJECT ACTIVITIES AND DATA SOURCES RELATED TO HYDROLOGY IN THE WARRIOR AND PLATEAU COAL FIELDS OF ALABAMA

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ABSTRACT

The report is a reference source on hydrologic information related to coal-mining activities in the Warrior and Plateau coal fields of Alabama. It contains a bibliography of more than 200 references and selected annotations. Also included is information on maps, automated-data bases, water-monitoring programs, and data-source agencies and organizations.

INTRODUCTION

The U.S. Geological Survey, Water Resources Division, began data collection in 1976 to define the hydrology of selected areas of the Warrior coal field. The U.S. Bureau of Land Management uses this hydrologic information in the preparation of environmental impact statements and other planning documents and in coal leasing actions.

The objective of this report is to provide summaries of past and ongoing coal-hydrology activities and hydrologic data available for the Warrior and Plateau coal fields in Alabama (fig. 1).

The summaries are separated into five categories as follows:

I. Reports and Documents with Selected Annotations

II. Maps

III. Automated Data Bases

IV. Water-Monitoring Programs

V. Source Agencies and Organizations

Acknowledgments

Acknowledgment is made to individuals, government agencies, and companies for their contributions to this bibliography. Contributors are listed in the Source Agencies and Organizations section of this report.

Special thanks go to Dorothy Brady, librarian, and Alex Sartwell, library assistant, of the Alabama Geological Survey, for their patience and cooperation during the compilation of this bibliography.

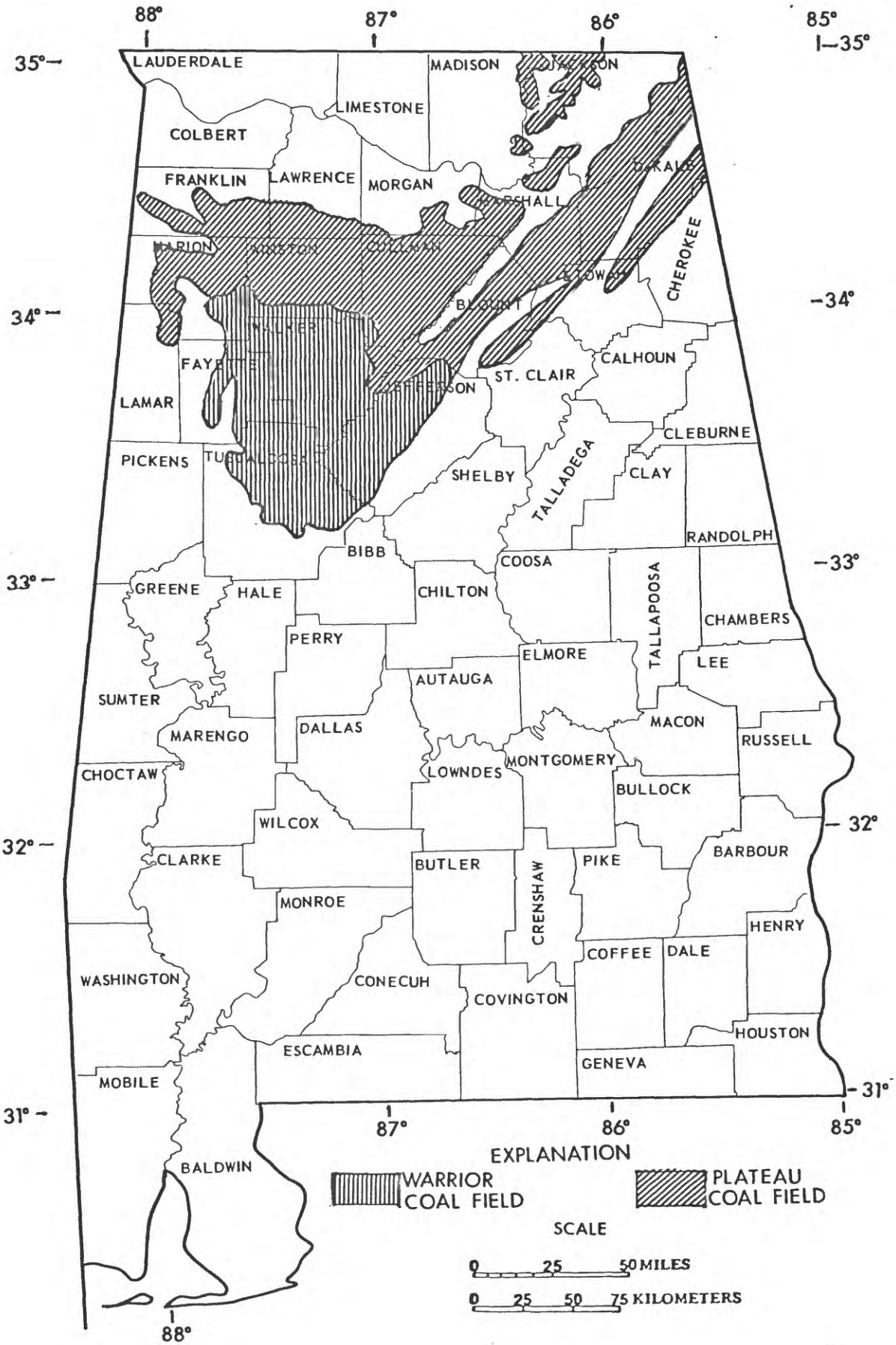

Figure 1.--Areas of study (modified from Ward and Evans, 1975).

REPORTS AND DOCUMENTS WITH SELECTED ANNOTATIONS

U.S. Geological Survey

Averitt, Paul, and Lopez, L., 1972, Bibliography and index of U.S. Geological Survey publications relating to coal, 1882-1970: U.S. Geological Survey Bulletin 1377, 173 p.

A compendium of 1,300 geological reports, maps, and statistical summaries. Includes reports describing results of technologic work on coal done by the U.S. Geological Survey prior to 1910, and results of statistical work prior to 1924. After these dates, these functions were assumed by the U.S. Bureau of Mines, and bibliographies of that agency should be consulted for similar more recent information.

Biesecker, J. E., and George, J. R., 1966, Stream quality in Appalachia as related to coal-mine drainage, 1965: U.S. Geological Survey Circular 526, 27 p.

Provides a regional comparison of the influence of coal-mine drainage on stream quality. The chemical quality at 200 of 318 sites did not meet recommended drinking-water standards, generally due to excessive concentrations of solutes commonly associated with coal-mine drainage.

Bodiford, B. G., 1981, Drainage areas for the upper Black Warrior River basin: U.S. Geological Survey, Water Resources Division, Tuscaloosa, Ala. 109 p.

Drainage areas in the Upper Black Warrior basin are tabulated in downstream order. Includes hydrologic unit maps.

Burchard, E. F., and Butts, Charles, 1910, Iron ores, fuels and fluxes of the Birmingham district, Alabama, with chapters on The origin of the ores, by E. C. Eckel: U.S. Geological Survey Bulletin 400, 204 p.

Section on Fuels and Fluxes (p. 170-188) by Butts describes the stratigraphy and physical properties of the principal coal beds of the Warrior Coal Field. It also contains descriptions of geologic sections for the various coal beds. Coking coal analyses and information on mining methods and coal washing are also included.

Butts, Charles, 1905, Warrior coal basin in the Brookwood quadrangle, Alabama: U.S. Geological Survey Bulletin 260-I, p. 357-381.

Discusses stratigraphy, structure, general mining conditions and developments, and coal groups and analyses.

Butts, Charles, 1906, The Warrior coal basin in the Birmingham Quadrangle, Alabama: U.S. Geological Survey Bulletin 285-F, p. 211-222.

Discusses stratigraphy, structure, general mining conditions and developments, and coal groups and analyses.

_____ 1907, Clays of the Birmingham district, Alabama: U.S. Geological Survey Bulletin 315-I, p. 291-295.

Brief discussion of clay and shale, with descriptions of geologic sections.

_____ 1911, Description of the Birmingham quadrangle, Alabama: U.S. Geological Survey Geologic Atlas, Folio 175, 24 p.

_____ 1927, Description of the Bessemer-Vandiver quadrangles, Alabama: U.S. Geological Survey Geologic Atlas, Folio 221, 22 p.

Collier, C. R., and Whetstone, G. W., 1965, Quality of water in the Appalachian Region in Schneider, W. J., and others, Water resources of the Appalachian Region, Pennsylvania to Alabama: U.S. Geological Survey Hydrologic Investigations Atlas HA-198, sheet 7.

Brief discussion of surface-water quality and map indicating surface-water type and range in dissolved solids for the Appalachian Region including north central Alabama.

Culbertson, W. C., 1963, Correlation of the Parkwood Formation and the lower members of the Pottsville Formation in Alabama: U.S. Geological Survey Professional Paper 450-E, p. 47-50.

Describes the correlation of lower members of the Pottsville Formation and redefines the top boundary and extent of the Parkwood Formation. Illustrates columnar sections and their locations.

_____ 1964, Geology and coal resources of the coal-bearing rocks of Alabama: U.S. Geological Survey Bulletin 1182-B, 79 p.

Estimates coal reserves in Alabama and describes the stratigraphy of the coal-bearing rocks. Includes maps showing the location of coal beds in the Warrior, Cahaba, and Coosa coal fields.

Doyle, W. H., Jr., 1981, The U.S. Geological Survey coal hydrology program and the potential of hydrologic models for impact assessments, U.S. Geological Survey Open-File Report 81-542, 56 p.

Describes how surface-water modeling techniques can be effectively applied to small watersheds, and also characterizes 12 "state-of-the-art" strip-mining assessment models that are to be tested with data from two studies involving small watersheds in Tennessee and Indiana. Includes discussion of the U.S. Geological Survey Coal Hydrology Program.

Edwards, M. D., 1980, Directory of Assistance Centers of the National Water Data Exchange (NAWDEX): U.S. Geological Survey Open-File Report 80-1193.

The National Water Data Exchange (NAWDEX), managed by the U.S. Geological Survey, has established a network of Assistance Centers throughout the United States and Puerto Rico to assist users of water data in identifying and locating the data. Provides information on how to contact any of the established centers.

German, E. R., 1976, Specific conductance of surface waters in Alabama: U.S. Geological Survey Open-File Report 76-505, U.S. Geological Survey, Tuscaloosa, Ala.

Harkins, J. R., and others, 1980, Hydrologic assessment, Eastern Coal Province Area 23, Alabama: U.S. Geological Survey Water-Resources Investigations Open-File Report 80-683, 76 p, U.S. Geological Survey, Tuscaloosa, Ala.

Discusses the hydrology of "Area 23" which includes all of the Warrior and Cahaba coal fields, and a small part of the Plateau coal field. Sections describe and illustrate water quality and quantity, geology, soils, land use, and data sources. Prepared to provide general information to the coal industry and Federal and State regulatory agencies.

_____ 1981a, Hydrology of Area 22, Eastern Coal Province, Alabama: U.S. Geological Survey Water-Resources Investigations, Open-File Report 81-135, 72 p., U.S. Geological Survey, Tuscaloosa, Ala.

Discusses the hydrology of "Area 22", which includes a small part of the Plateau coal field. Sections describe and illustrate water quality and quantity, geology, soils, land use, and data sources. Prepared to provide general information to the coal industry and Federal and State regulatory agencies.

_____ 1981b, Hydrology of Area 24, Eastern Coal Province, Alabama and Georgia: U.S. Geological Survey Water-Resources Investigations Open-File Report 81-1113, [in press], U.S. Geological Survey, Tuscaloosa, Ala.

Discusses the hydrology of "Area 24", which includes all of the Coosa coal field and the eastern part of the Plateau coal field. Sections describe and illustrate water quality and quantity, geology, soils, land use, and data sources. Prepared to provide general information to the coal industry and Federal and State regulatory agencies.

Hayes, C. W., 1895, Description of the Stevenson sheet, Alabama-Georgia-Tennessee: U.S. Geological Survey Geologic Atlas, Folio 19, 4 p.

_____ 1896, Description of the Gadsden quadrangle, Alabama: U.S. Geological Survey Geologic Atlas, Folio 35, 5 p.

_____ 1902, The southern Appalachian coal field: U.S. Geological Survey 22nd Annual Report 1900-1901, pt. lll-e, 227 p.

Hubbard, E. F., 1975, Water quality reconnaissance of Lake Tuscaloosa, Alabama, March-June 1975: U.S. Geological Survey Open-File Report 76-160, 34 p., U.S. Geological Survey, Tuscaloosa, Ala.

Assesses the effects of existing development on lake water quality and provides baseline data against which future changes in water quality can be estimated. Includes water-quality and bed-material analyses, vertical profiles of selected water-quality constituents, and bacteriological determinations.

_____ 1976, Sedimentation in Lake Tuscaloosa, Alabama: U.S. Geological Survey Open-File Report 76-158, 35 p., U.S. Geological Survey, Tuscaloosa, Ala.

An estimated sediment yield of the North River basin is reported. Also estimated, based on the percentage of the drainage basin severely exposed, is the time required to completely fill the storage capacity of Lake Tuscaloosa. Recommendations are included for reducing sedimentation in the lake from urbanization and surface mining.

Knight, A. L., and Newton, J. G., 1977, Water and related problems in coal-mine areas: U.S. Geological Survey Water-Resources Investigations 76-130, 51 p.

Describes water and related problems or potential problems in Alabama that result from surface and subsurface coal mining. Problems described include erosion and sedimentation, flooding, diversion of drainage, decline in water level, land subsidence, and the degradation of water quality.

Meyer, Gerald, 1965, Geology and mineral resources of the Region, in Schneider, W. J., and others, Water resources of the Appalachian Region, Pennsylvania to Alabama: U.S. Geological Survey Hydrologic Investigations Atlas HA-198, Sheet 3.

Geologic map (1:2,500,000) of the Appalachian Region including north-central Alabama. Also gives a brief discussion of water-supply and lithologic characteristics of rock types. Locations of coal, oil, and gas regions are shown.

Meyer, Gerald, Wilmoth, B. M., and LeGrand, H. E., 1965, Availability of ground water in the Appalachian Region, in Schneider, W. J., and others, Water resources of the Appalachian Region, Pennsylvania to Alabama: U.S. Geological Survey Hydrologic Investigations Atlas HA-198, Sheet 10.

Map shows least- to most-favorable areas for development of large ground-water supplies, including localities of high production (100 gallons per minute or more). Includes general discussion of ground-water availability.

Musser, J. J., 1965, Acid mine drainage in the Appalachian Region, in Schneider, W. J., and others, Water resources in the Appalachian Region, Pennsylvania to Alabama: U.S. Geological Survey Hydrologic Investigations Atlas HA-198, Sheet 9.

Gives brief discussion of acid mine drainage. Map shows coal fields and two categories of streams: those containing free mineral acid and acid-producing salts, and those influenced by mine drainage but seldom containing free acid or acid-producing salts.

Nokes, J. M., and Blackwell, C. D., 1981, Directory of member organizations of the National Water Data Exchange (NAWDEX): U.S. Geological Survey Open-File Report 81-497.

Provides names, addresses, and telephone numbers of all NAWDEX member organizations and their designated NAWDEX representatives.

Puente, Celso, and Newton, J. G., 1979, Effect of surface coal mining on the hydrology of Crooked and Turkey Creek basins, Jefferson County, Alabama: U.S. Geological Survey Water-Resources Investigations 79-91, 39 p.

Describes impacts of surface coal mining on the hydrology of Crooked and Turkey Creek basins in the northeast part of the Warrior coal field. Also provides information obtained from the monitoring of stream-flow, sediment yield, and water quality.

Puente, Celso, and Newton, J. G., 1981, Hydrology of potential mining areas in the Warrior Coal Field, Alabama: U.S. Geological Survey Water-Resources Investigations Open-File Report 82-105, U.S. Geological Survey, Tuscaloosa, Ala.

Puente, Celso, Newton, J. G., and Bingham, R. H., 1981, Assessment of hydrologic conditions in potential coal-lease tracts in the Warrior coal field, Alabama: U.S. Geological Survey Water-Resources Investigations 81-540, 65 p. (in press).

The hydrology of four potential coal-lease tracts in the Pottsville Formation are assessed. Local and regional data are used to describe streamflow characteristics, surface-water quality, and ground-water availability and quality. Climatic, physiographic, hydrologic, and land-use data were analyzed by regressions to derive estimates of specific conductance and other constituents such as hardness, dissolved solids, and sulfate loads. Impacts that will result from future mining are defined, and methods used to estimate these impacts on surface water quality are described.

Puente, Celso, Newton, J. G., and Hill, T. J., 1980, Hydrology of selected basins in the Warrior coal field, Alabama---A progress report: U.S. Geological Survey Water-Resources Investigations 80-22, 62 p.

Water quality and quantity data for four small basins located in two geologically different environments (Pottsville and Coker Formations) in Tuscaloosa County are given. Includes information on sediment and aquatic biology.

Schneider, W. J., 1965a, Floods in the Appalachian Region in Schneider, W. J., and others, Water resources of the Appalachian Region, Pennsylvania to Alabama: U.S. Geological Survey Hydrologic Investigations Atlas HA-198, Sheet 6.

Includes flood data for Black Warrior River and other selected streams in the Appalachian Region and a discussion of regional floods and a map showing 50-year flood-index values.

_____ 1965b, Surface water development in the Appalachian Region in Schneider, W. J., and others, Water resources of the Appalachian Region, Pennsylvania and Alabama: U.S. Geological Survey Hydrologic Investigations Atlas HA-198, Sheet 11.

Discusses surface-water development in the Appalachian Region (including Alabama) and map-list of existing reservoirs having 5,000 acre-feet or more of usable capacity.

Schneider, W. J., 1965c, Precipitation in the Region in Schneider, W. J., and others, Water resources of the Appalachian Region, Pennsylvania and Alabama: U.S. Geological Survey Hydrologic Investigations Atlas HA-198, Sheet 2.

Contains map showing average annual precipitation in inches, and precipitation and water budgets for selected sites in the Region. Includes brief discussion of precipitation patterns, seasonal variations, and potential evapotranspiration.

Schneider, W. J., and Barksdale, H. C., 1965, Description of the Appalachian Region, in Schneider, W. J., and others, Water resources of the Appalachian Region, Pennsylvania and Alabama: U.S. Geological Survey Hydrologic Investigations Atlas HA-198, Sheet 1.

Brief discussion of the Appalachian Region with reporting area, physiographic boundaries, and major cities. Includes selected references on water resources, geology, streamflow, water quality, sediment, acid-mine drainage, and ground water.

Schneider, W. J., and Friel, E. A., 1965, Low flows in the Region in Schneider, W. J., and others, Water resources of the Appalachian Region, Pennsylvania and Alabama: U.S. Geological Survey Hydrologic Investigations Atlas HA-198, Sheet 5.

Map shows average annual low and minimum daily flows for north-central Alabama and rest of Appalachian Region. Includes brief discussion of low flows.

U.S. Geological Survey, 1978, Water resources data for Alabama, water year 1977: U.S. Geological Survey Water-Data Report, AL 77-1, 459 p.

_____ 1979, Water resources data for Alabama, water year 1978: U.S. Geological Survey Water-Data Report, AL 78-1, 568 p.

_____ 1980, Water resources data for Alabama, water year 1979: U.S. Geological Survey Water-Data Report, AL 79-1 and AL 79-2, 693 p.

Wark, J. W., 1965, Sediment load of streams in the region, in Schneider, W. J., and others, Water resources of the Appalachian Region, Pennsylvania and Alabama: U.S. Geological Survey Hydrologic Investigations Atlas 198, Sheet 8.

Map showing average annual sediment yield in tons per square mile for north-central Alabama and other regions. Includes brief discussion of sediment load in streams.

Geological Survey of Alabama

Adams, G. I., and others, Geology of Alabama: Alabama Geological Survey Special Report 14, 312 p.

Avrett, J. R., 1966, A compilation of surface water quality data in Alabama: Alabama Geological Circular 36, 574 p.

Discusses the chemical and physical character of water and the significance of each. Quality of water data, including chemical analyses, temperature observations, radiochemical analyses, and sediment data are compiled separately by drainage basin in downstream order. Data for 992 surface-water sites are tabulated.

_____ 1968, A compilation of ground-water quality data in Alabama: Alabama Geological Circular 37, 336 p.

Discusses the chemical and physical character of water and the significance of each. The chemical analyses are compiled in separate tables by county (3,692 analyses). Radiochemical data for 14 sites are compiled separately.

Avrett, J. R., and Carroon, L. E., 1964, Temperature of Alabama streams: Alabama Geological Survey Information Series 35, 165 p.

Includes summaries of continuous thermograph records and results of occasional observations at time of streamflow measurements.

Beg, M. A., and others, 1978, Mineral resources of Tuscaloosa County, Alabama: Alabama Geological Survey Special Map 185, 80 p.

Describes the occurrence and quality of the mineral resources of Tuscaloosa County, including a discussion of coal groups. Maps show the distribution of surface coal mines and spoils before 1975.

Bingham, R. H., 1979, Low-flow characteristics of Alabama streams: Alabama Geological Survey Bulletin 117, 39 p.

Describes a new procedure for estimating the 7-day 2-year and the 7-day 10-year low flow of ungaged Alabama streams. One equation for each of the two low-flow frequencies applies statewide to all natural flow streams. Examples using the estimating procedures are given.

Bingham, R. H., and Moore, J. D., 1980, Summary of streamflow in Jefferson County, Alabama: Geological Survey of Alabama Atlas 16, 21 p.

The magnitude and variability of streamflow at 11 qaging stations are shown by flow-duration curves, monthly distribution graphs, graphs of annual means, and maximum and minimum flows of record. Discharge measurements at 62 other sites are listed.

Boyle, J. R., and Neathery, T. L., 1974, The mineral industry of Alabama 1974, in U.S. Bureau of Mines Minerals Yearbook: Alabama Geological Survey Reprint Series 48, Volume 2 area reports, p. 1-13.

Causey, L. V., 1961a, Geologic map of Etowah County: Alabama Geological Survey Special Map 15.

_____ 1961b, Ground-water resources of Etowah County, Alabama, a reconnaissance report: Alabama Geological Survey Information Series 25, 63 p.

Discusses recovery of ground water, geologic formations and their water-bearing properties, and quality of water. Includes tabulations of well and spring records.

_____ 1965a, Geologic map of Cherokee County, Alabama. Alabama Geological Survey Special Map 39.

_____ 1965b, Geology and ground-water resources of Cherokee County, Alabama, a reconnaissance: Alabama Geological Survey Bulletin 79, 63 p.

Discusses ground-water occurrence, storage, recovery, and use; geologic formations and their water-bearing properties; and water quality. Includes tabulation of basic data and well sample descriptions.

Causey, L. V., Wahl, K. D., Jefferson, P. O., and Harris, W. F., Jr., 1972, Water availability and geology in Marion County, Alabama: Alabama Geological Survey Map 105, 31 p.

Causseaux, K. W., 1973, Metropolitan Birmingham and Jefferson County, Alabama: Flood, March 19-20, 1970: Alabama Geological Survey Atlas Series 2, 11 p.

Presents streamflow data collected during and immediately after an intense storm. Information is shown on a series of maps depicting the extent of areas inundated by flooded streams. The flood event is described in terms of rainfall, streamflow, and flood elevations.

Chaffin, H. S., Jr., 1972, Mineral resources of Franklin County, Alabama: Alabama Geological Survey Special Map 114, 9 p.

Information is given on the occurrence, availability, quantity, and quality of mineral resources in Franklin County, including coal and iron ore.

Cherry, R. N., 1963, Chemical quality of Alabama streams 1960, reconnaissance study: Alabama Geological Survey Information Series 27, 95 p.

Presents findings of a reconnaissance of the water quality of streams in Alabama during 1960. Relates chemical characteristics of surface water to natural conditions.

Copeland, C. W., Jr., 1975, Pilot study of overburden on Federal coal lands, Berry vicinity, Fayette County, Alabama: Geological Survey of Alabama Open-File Report, 48 p., U.S. Bureau of Land Management, Tuscaloosa, Ala.

Characterizes the geochemistry of overburden materials overlying coal seams on Federal coal lands. Contains lithologic information from four core holes, test-well descriptions, measured sections, and a structure contour map of the Upper Cobb coal seam.

Daniel, T. W., Jr., Clarke, O. M., Jr., and Szabo, M. W., 1969, Mineral resources map of Winston County, Alabama: Alabama Geological Survey Special Map 74, 8 p.

Daniel, T. W., Jr., and Fies, M. H., 1971, Strippable coal in the Fabius area, Jackson County, Alabama: Alabama Geological Survey Bulletin 96, 91 p.

Contains basic data and sample descriptions of exploratory drillhole samples from the Underwood coal seam. Includes a map showing the geologic structure, coal thickness, overburden thickness, and delineation of coal outcrop.

Dills, G. G., and Rogers, D. T., Jr., 1972, Aquatic-biotic community structure as an indicator of pollution: Alabama Geological Survey Circular 80, 25 p.

_____ 1974, Macroinvertebrate community structure as an indicator of acid mine pollution: Environmental Pollution, v. 6, p. 239-262.

Described water quality parameters and biological surveys at 10 sampling stations in Cane Creek, Walker County, Alabama. Related diversity of species to pH.

Dodson, C. L., and Harris, W. F., Jr., 1961, Interim report on the geology and ground-water resources of Morgan County, Alabama: Alabama Geological Survey Information Series 24, 129 p.

_____ 1965, Geology and ground-water resources of Morgan County, Alabama: Alabama Geological Survey Bulletin 75, 90 p.

Drennen, C. W., 1961, Geologic map of Tuscaloosa County, Alabama: Alabama Geological Survey Special Map 16.

Shows distribution of geologic formations and ground water supplies.

Ehrlich, Robert, 1964, Field trip guidebook to the Pottsville Formation in Blount and Jefferson Counties: Alabama Geological Society, 1st annual field trip: Alabama Geological Survey Guidebook, 9 p.

_____ 1965, The geologic evolution of the Black Warrior detrital basin: unpublished Ph.D. dissertation, Louisiana State University.

Ellard, J. S., 1971, Techniques of evaluating effects of water on drainage structures in Alabama: Alabama Geological Circular 75, 14 p.

Two methods of regression analyses were used to predict "years to perforation" of galvanized steel culverts, based on pH, resistivity, and dissolved-oxygen characteristics of water passing through individual culverts. Includes tables of culvert site data and corrosion conditions.

Faust, R. J., and Harkins, J. R., 1980, Water availability of Blount County, Alabama: Alabama Geological Survey Map 141, 19 p.

Faust, R. J., and Jefferson, P. O., 1980, Geology and water availability of Cullman County, Alabama: Alabama Geological Survey Map 145, 30 p.

Gamble, C. R., 1965, Magnitude and frequency of floods in Alabama, Alabama Highway Department HPR Report No. 5, 42 p.

George, I. D., and Beg, M. A., 1975, Directory of active mines and quarries in Alabama: Alabama Geological Survey Special Map 176, 3 p.

Gives locations of mines and quarries by section, township, and range. Includes tables giving the county, location, formation mined, name of the quarry or mine, and the name and address of the company.

George, I. D., Clarke, O. M., Kidd, J. T., Wilson, G. V., and Masingill, J. H., 1978, Mineral resources of Fayette County, Alabama: Alabama Geological Survey Special Map 183, 46 p.

Describes geology, physiography, major coal groups and coal outcrops. Contains maps showing the distribution of coal surface mines in Fayette County prior to 1975.

Gibson, A. M., 1893, Report on the coal measures of Blount County: Alabama Geological Survey Special Report 5, 80 p.

Includes descriptions of geologic sections in test pits on Blount Mountain, Blount County, Alabama. Berry Mountain and Sand Mountain coal measures are also described.

Gilbert, O. E., Jr., and Smith, W. E., 1972, Bibliography of Alabama coals: Alabama Geological Circular 77, 55 p.

Gives a bibliography of Alabama coal to facilitate literature research by geologists, mining engineers, and mine operators.

Griggs, J. H., Carey, J. A., and Pearson, R. L., 1978, Water laws of Alabama (3rd ed.): Alabama Geological Survey Bulletin 89, 502 p.

Contains legal principles and propositions connected with the water resources of Alabama, and includes information on water rights, water control, and water use. Court decisions which concern the use and control of the State's water and waterways are also included.

Hains, C. F., 1968, Flow characteristics of Alabama streams, a basic data report: Alabama Geological Circular 32, 382 p.

Contains tables with information on streamflow duration, lowest mean discharge, and highest mean discharge for selected periods at each of 211 gaging stations having a year or more of record through September 1963.

_____ 1977, Regional flood depth-frequency relations of Alabama: Alabama Geological Survey Circular 97, 13 p.

Regional relationships are given for estimating the depth of water of floods having a recurrence interval of 10- and 100-years on natural flow streams in Alabama. Six hydrogeologic areas are identified.

Hammond, S. V., 1975, Mineral laws of Alabama: Alabama Geological Survey Information Series 54.

Provides the layman or general practitioner with various aspects of mineral law in Alabama, particularly general property concepts related to minerals, the mineral lease, environmental regulations, and statutory provisions covering hard minerals.

Harkins, J. R., 1972, Surface-water availability, Etowah County, Alabama: Alabama Geological Survey Special Map 108, 11 p.

Contains discussions of average flow, variability of flow, low-flow characteristics, streamflow budget, and quality of surface water. Accompanying map shows median annual 7-day low flow and average flow for major streams.

Harkins, J. R., O'Rear, D. M., and Knight, A. L., 1972, Surface-water availability, Franklin County, Alabama: Alabama Geological Survey Special Map 106, 11 p.

Describes the median annual 7-day low flow, variability of flow, streamflow budget, and quality of surface water. Includes hydrograph of monthly flows, flow-duration curves of selected streams, and chemical analyses.

Harris, A. J., and Watson, W. T., 1968, Water laws of Alabama: Alabama Geological Survey Bulletin 89, 155 p.

Harris, W. F., Jr., and Causey, L. V., 1973, Geologic map of Marion County, Alabama: Alabama Geological Survey, Special Map 104.

Harris, W. F., Jr., and McMaster, W. M., 1965a, Generalized geologic map of Lawrence County, Alabama: Alabama Geological Survey Special Map 31.

Includes information on physiography, drainage, general stratigraphy, and general geologic structure.

_____ 1965b, Geology and ground-water resources of Lawrence County, Alabama: Alabama Geological Survey Bulletin 78, 70 p.

Presents information on geologic formations and their water-bearing properties, ground-water storage and recharge, water-level fluctuations and their significance, and water quality. Includes well and spring records and drillers' logs of selected wells.

Hayes, E. C., 1978, 7-Day low flows and flow duration of Alabama streams through 1973: Alabama Geological Survey Bulletin 113, 163 p.

Provides estimates of annual 7-day low flows with 2-year and 10-year recurrence intervals. Estimates for one or both low-flow parameters are tabulated for 527 locations on 341 streams.

Hyde, L. W., 1971a, Acid mine drainage in Cane Creek basin near Oakman, Walker County, Alabama: Alabama Geological Circular 64, 19 p.

Discusses acid mine drainage, quality of drainage, effects on highway drainage structures, and control of acid drainage.

_____ 1971b, Effects of water and soil on drainage structures in Alabama, Phase I: Alabama Geological Survey Bulletin 92A, 289 p.

Discusses the chemical quality of soils and surface water in Alabama, effects of pH on selected drainage-structure materials, and recommendations based on water pH for use of these materials in certain areas.

Johnston, W. D., Jr., 1930, Physical divisions of northern Alabama: Alabama Geological Survey Bulletin 38, 48 p.

_____ 1932, A revision of physical divisions of northern Alabama: Journal of the Washington Academy of Sciences, v. 22, no. 8, p. 220-223.

_____ 1953, Ground water in the Paleozoic rocks of northern Alabama: Alabama Geological Survey Special Report 16, 414 p.

Describes the physiography and geology of northern Alabama, the occurrences of ground water, and the areal distribution, lithologic character, and water-bearing properties of geologic formations.

Joiner, T. J., and others, 1978, Remote sensing of strippable coal reserves and mine inventory in part of the Warrior coal field in Alabama: Alabama Geological Survey, University, Alabama, 128 p. NTIS publication NT8-32520/6 GA.

Kidd, J. T., 1976a, Configuration of the top of the Pottsville Formation in west-central Alabama: Alabama Oil and Gas Board, Oil and Gas Map 1.

_____ 1976b, Pre-Mississippi subsurface stratigraphy of the Warrior Basin in Alabama, in Gulf Coast Association of Geological Societies Transactions: Alabama Geological Survey Reprint Series 47, v. 25, 1975, p. 20-39.

Presents subsurface data obtained from oil and gas test wells in the Warrior basin. Includes structural contour and regional isopach maps, and stratigraphic cross section.

Kidd, J. T., and Shannon, S. W., 1977, Preliminary areal geological maps of the Valley and Ridge Province, Jefferson County, Alabama: Alabama Geological Survey Atlas Series 10, 41 p.

Areal geology given on 7½-minute topographic quadrangle maps at a scale of 1:48,000. Includes parts of the Warrior River basin.

Knight, A. L., 1972, Water availability of Fayette County, Alabama: Alabama Geological Survey Special Map 134, 19 p.

Provides information on the availability of ground water and surface water in Fayette County. Contains information on water quality, geologic formations and their water-bearing properties, and selected wells.

_____ 1976, Water availability, Jefferson County, Alabama: Alabama Geological Survey Special Map 167, 31 p.

Includes information on potential sources and chemical quality of surface and ground water, and water uses in Jefferson County.

Lineback, N. G., Peirce, L. B., and Turnage, N. E., 1974, The map abstract of water resources: Alabama: Alabama Geological Survey Map Abstracts 2, 105 p.

Presents computer maps (chloropleth and isoline), previously published maps, and conventional maps showing water use and withdrawal, stream discharge, ground water availability, and individual water quality constituents of ground water and surface water, including selected secondary streams.

Lloyd, N. A., Chaffin, H. S., Jr., and McLendon, J. T., 1972, Mercury concentrations in sediment samples from Tennessee, Mobile, and Tombigbee Rivers, Alabama: Alabama Geological Survey Circular 79, 12 p.

Analytical data for sediment samples is presented to determine the possibilities of reclaiming mercury from contaminated streams in Alabama. Includes maps showing sampling sites and sampling traverses.

McCalley, Henry, 1886, On the Warrior coal field: Alabama Geological Survey Special Report 1, 571 p.

Contains a description of the Warrior coal field and detailed descriptions of the coal measures of Marion, Winston, Cullman, Lamar, Fayette, Walker, Jefferson, and Tuscaloosa Counties.

_____ 1891, Report on the coal measures of the Plateau Region of Alabama, including a report on the coal measures of Blount County, by A. M. Gibson: Alabama Geological Survey Special Report 3, 238 p.

Describes the Plateau Region and the coal measures of Madison, Jackson, Marshall, Morgan, Lawrence, Franklin, DeKalb, Cherokee, Etowah, Blount, St. Clair, and Shelby Counties.

_____ 1899, Map of the Warrior coal basin, with columnar sections: Alabama Geological Survey Special Map 2.

Shows coal groups, other geologic formations, and columnar sections.

McCalley, Henry, 1900, Report on the Warrior coal basin: Alabama Geological Survey Special Report 10, 327 p.

McGlamery, Winnie, 1955, Subsurface stratigraphy of northwest Alabama: Alabama Geological Survey Bulletin 64, 503 p.

Gives paleo-stratigraphic reports on well logs from 17 counties in northern Alabama.

Mettee, M. F., Moser, P. H., and Dean, Lewis, 1978, Use of water in Alabama, 1975, with projections to 2020: Alabama Geological Survey Information Series 48, 45 p.

Presents an analysis of water use in Alabama and reports withdrawals by counties and major river basins. Compares present and projected water use with available supply.

Mettee, M. F., Williams, J. S., and O'Neil, P. E., 1979, A study of the fishes in selected streams that drain lands of Federal Mineral Ownership, Tuscaloosa, Fayette, and Walker Counties, Alabama: Alabama Geological Survey Bulletin 119, 180 p.

Provides information on fish collection at eight stream sites in five basins that drain Federal lands in Tuscaloosa, Fayette, and Walker Counties, Alabama. Monthly and cumulative species abundance, biomass, diversity, evenness, and other data are included. Used data to show a relationship between stream size, as it is related to headwater mileage, and the cumulative number of species collected.

Metzger, W. J., 1965, Pennsylvanian stratigraphy of the Warrior Basin, Alabama: Alabama Geological Survey Circular 30, 80 p.

Describes the stratigraphic succession of Pennsylvanian rocks exposed within the Warrior Basin and the lateral variations within this succession. Rocks of Pennsylvanian age are subdivided and correlated with Pennsylvanian deposits in other areas. Mineable coal deposits in the sequence are classified into seven groups.

Miller, J. D., Jr., and Causey, L. V., 1958, Geology and ground-water resources of Tuscaloosa County, Alabama, an interim report: Alabama Geological Survey Information Series 14, 71 p.

Describes geologic formations and their water-bearing properties, occurrence and storage of ground water, water-table and artesian conditions, water-level fluctuations and their significance, and quality of water.

Moore, J. D., and Bolin, D. E., 1980, Hydrologic baseline evaluation of streams and well inventory on selected Federal coal lands in the western Black Warrior Basin, Alabama: Geological Survey of Alabama Open-File Report, U.S. Bureau of Land Management, Tuscaloosa, Ala.

Evaluates quality of surface and ground water in and adjacent to selected Federal Mineral Ownership (FMO) tracts. Includes discharge measurements for 25 surface water sites and chemical analyses for 126 ground-water sites.

Moser, P. H., and Hyde, L. W., 1975, Environmental geology: An aid to growth and development in Lauderdale, Colbert, and Franklin Counties, Alabama: Alabama Geological Survey Atlas Series 6, 45 p.

Discusses engineering geology, surface- and ground-water characteristics, chemical quality of water, and mineral resources. Numerous maps are included.

Neathery, T. L., Clarke, O. M., Jr., Szabo, M. W., Smith, W. E., and White, D. H., 1969a, Mineral resources map of Etowah County, Alabama: Alabama Geological Survey Special Map 86.

Includes descriptions of outcropping geologic formations.

_____ 1969b, Mineral resources map of DeKalb County, Alabama: Alabama Geological Survey Special Map 85.

Includes generalized geologic column of formations underlying DeKalb County, Alabama.

O'Rear, D. M., 1957, Water levels and artesian pressures in Alabama, 1955: Alabama Geological Survey Information Series 5, 49 p.

Contains water-level data for 30 observation wells in various regions of Alabama and a discussion of water-level fluctuations.

_____ 1960, Ground-water levels in Alabama in 1957 and 1958: Alabama Geological Survey Information Series 19, 81 p.

Contains water-level data for 33 observation wells in various regions of Alabama and a discussion of water-level fluctuations.

_____ 1964, Ground-water levels in Alabama in 1959 and 1960: Alabama Geological Survey Circular 23, 123 p.

Basic data report on water-level fluctuations and precipitation. Includes a list of ground-water reports published during the period of study.

O'Rear, D. M., Knowles, D. B., 1955, Water levels and artesian pressures in Alabama, 1954: Alabama Geological Survey Information Series 2, 49 p.

Contains water-level data for 24 observation wells in various regions of Alabama, with an interpretive discussion of water-level

O'Rear, D. M., and Wahl, K. D., 1972, Geology of Walker County, Alabama: Alabama Geological Survey Special Map 123.

Map shows the distribution of the Pottsville and Coker Formations and terrace deposits.

O'Rear, D. M., Wahl, K. D., and Jefferson, P. O., 1972, Water availability and geology of Walker County, Alabama: Alabama Geological Survey Special Map 120, 21 p.

Discusses geology of the Pottsville and Coker Formations and terrace deposits and describes the availability and quality of ground water and surface water.

Paulson, Q. F., Miller, J. D., Jr., and Drennen, C. W., 1962, Groundwater resources and geology of Tuscaloosa County, Alabama: Alabama Geological Survey County Report 6, 97 p.

Discusses geologic formations and their water-bearing characteristics, water-level fluctuations, and water quality. Contains well tables and illustrates lithologic and electric logs of selected wells.

Peace, R. R., Jr., 1963a, Geologic map of Franklin County, Alabama: Alabama Geological Survey Special Map 22.

_____ 1963b, Geology and ground-water resources of Franklin County, Alabama, a reconnaissance report: Alabama Geological Survey Bulletin 72, 55 p.

Includes discussions of geologic units and their water-bearing properties, and water-level fluctuations and their significance. Chemical analyses of ground water and well records are given in tables.

Peirce, L. B., 1959, Surface-water resources and hydrology of west-central Alabama: Alabama Geological Survey Special Report 24, 236 p.

Contains data on climate, topography, soils, streamflow characteristics of selected sites, and chemical quality of surface water in west-central Alabama. Study area includes parts of the Black Warrior and Tombigbee River basins.

Peirce, L. B., 1964, Reservoir temperatures in north-central Alabama: Alabama Geological Survey Bulletin 82, 103 p.

Discusses seasonal variations in reservoir temperature, and presents temperature data for selected impoundments. Depth-profile diagrams are included.

_____ 1967, 7-Day low flows and flow duration of Alabama streams: Alabama Geological Survey Bulletin 87, 114 p.

Includes annual 7-day low flows of 1-year and 10-year recurrence intervals for approximately 600 locations on 357 streams in Alabama. Charts are provided for estimating 2-year (median) 7-day low flows.

_____ 1972, Use of water in Alabama, 1970, with projections to 2020: Alabama Geological Survey Information Series 42, 77 p.

Provides information on water use, trends, demands versus supply, and water use projections.

Peirce, L. B., and Grantham, R. G., 1962, Surface water in Tuscaloosa County, Alabama: Alabama Geological Survey County Report 9, 89 p.

Describes surface water data collection methods and analyses of low flow, floods, water temperature, and chemical quality of surface water. Frequency of storage requirements and flow duration curves of selected streams are also included.

Powell, W. J., and Duncan, A. C., 1965, Water-level fluctuations and chemical quality of ground water in Alabama: Alabama Geological Survey Special Map 29.

Illustrates water levels and monthly precipitation for selected observation wells and provides information on types of chemical analyses available for different areas. Other maps illustrate general areas of artesian flow and iron, chloride, and hardness concentrations.

Powell, W. J., and LaMoreaux, P. E., 1959, Ground-water investigations in Alabama with a selected bibliography: Alabama Geological Survey Information Series 15, 4 p.

Discusses historical ground-water studies in Alabama, and provides a bibliography of 32 references.

Riley, H. L., and Smith, W. E., 1974, The mineral industry of Alabama, 1972, in U.S. Bureau of Mines Minerals Yearbook: Alabama Geological Survey Reprint Series 31, v. 2, p. 1-13.

Discusses mineral production in Alabama and reviews mineral commodities. Contains a table of principle producers by commodity, company, address, type of activity, and county.

Sanford, T. H., Jr., 1966, Ground water in Marshall County, Alabama, a reconnaissance: Alabama Geological Survey Bulletin 85, 66 p.

Describes ground-water occurrence, availability, use, and chemical quality. Contains well records and sample logs of selected wells.

Sapp, C. D., and Emplaincourt, J. L., 1975, Physiographic regions of Alabama: Alabama Geological Survey Special Map 168.

Sartwell, Alexander, 1979, Index and list of the publications of the Geological Survey of Alabama and the State Oil and Gas Board, 43 p.

Contains publications by the Geological Survey of Alabama on the mineral, water, and petroleum resources of the State. Available from the Publications Sales Office, Geological Survey of Alabama, P. O. Drawer O, University, Alabama.

Scott, J. C., 1977, Drainage area for Jefferson County, Alabama: Alabama Geological Survey Atlas Series 11, 55 p.

Maps show drainage divides and give measured drainage areas, in square miles, at selected sites along most streams. Sites for which significant stream-discharge and water quality data are available are shown on the maps.

_____ 1978, Drainage area for the Upper Black Warrior River basin, Alabama: Alabama Geological Survey Atlas Series 12, 157 p.

Maps provide drainage areas for stream basins in the Black Warrior River basin upstream from Bankhead Lock and Dam. Drainage areas are given in square miles at selected sites along most streams. Sites for which significant stream-discharge and water quality data are available are shown on the maps.

Semmes, D. R., 1929, Oil and gas in Alabama: Alabama Geological Survey Special Report 15, 400 p.

Shamburger, V. M., Ellard, J. S., and Hyde L. W., 1970, Effects of water and soil on drainage structure in Alabama, Phase II: Alabama Geological Survey Bulletin 92B, 47 p.

Soil and water quality parameters for 582 surface water sites are presented for three drainage basins, each representing different hydrologic environments. Statistical relationships of these parameters to observed conditions of various types of culvert pipe are also described.

Simpson, T. A., 1975, Hydrology of the North River No. 1 Mine, Republic Steel Corporation, Berry, Alabama: Geological Survey of Alabama (unpublished).

Provides surface-water and ground-water quality data for the mine area and discusses the occurrence and movement of surface water and ground water.

Smith, W. E., 1971, Summary report on the geology and mineral resources of the Bee Branch area of the Bankhead National Forest: Alabama Geological Survey Open-File Report, University, Ala.

_____ 1972, Mineral, water, and energy resources of Winston County, Alabama: Alabama Geological Survey Information Series 45, 67 p.

Provides information on the topography, geology, water resources, mineral resources, energy, and history of Winston County. Includes selected well and spring records, water-quality data, and gives locations of coal occurrences by township, range, and section.

Smith, W. E., and Gilbert, O. E., 1975, Mining and minerals in Alabama: Alabama Geological Survey Information Series 47, 36 p.

Discusses the mineral industry and potential mineral resources of Alabama, including bituminous coal and lignite.

Szabo, M. W., Beg, M. A., Rheams, L. J., and Clarke O. M., Jr., 1979, Engineering geology of Jefferson County, Alabama: Alabama Geological Survey Atlas, 77 p.

Provides geologic, hydrologic, and engineering characteristics of the rocks and soils.

Szabo, M. W., Daniel, T. W., Jr., and Clarke, O. M., Jr., 1969, Mineral resources map of Marion County, Alabama: Alabama Geological Survey Special Map 88.

Delineates seams of five coal groups in Marion County and discusses each. Outcrop and drill-hole data are tabulated.

_____ 1972, Mineral resources of Marion County, Alabama: Alabama Geological Circular 78, 22 p.

Describes geology and five coal seams of potential economic value. Table includes locations and thicknesses of coal deposits.

Thomas, W. A., 1972, Mississippian stratigraphy of Alabama: Alabama Geological Survey Monograph 12, 121 p.

_____ 1974, Converging clastic wedges in the Mississippian of Alabama, in Briggs, G., ed., Carboniferous of the southeastern United States: Geological Society America Special Paper 148, p. 187-208.

Toulmin, L. D., 1945, Well logs of Alabama, 1940-1945: Alabama Geological Survey Bulletin 57, 177 p.

Valkenburg, N., Christian, R., and Green, M., 1975, Occurrence of iron bacteria in ground-water supplies of Alabama: Alabama Geological Survey Circular 96, 45 p.

Presents data on the extent of water-well contamination by iron bacteria and the occurrence of iron bacteria as related to water quality.

Wahl, K. D., 1965, Ground-water resources of Pickens County, Alabama, a reconnaissance: Alabama Geological Survey Bulletin 83, 84 p.

Describes ground-water occurrence, storage, recovery, and use; geologic formations and their water-bearing properties; and water quality. Includes sample logs and tables giving well and water-quality data.

Wahl, K. D., Harris, W. F., and Jefferson, P. I., 1971, Water resources and geology of Winston County, Alabama: Alabama Geological Survey Bulletin 97, 29 p.

Describes availability and quality of ground water and surface water. Contains well-log, well and spring, and water-quality data.

Wahl, K. D., and O'Rear, D. M., 1972, Geology of Walker County, Alabama: Alabama Geological Survey Special Map 123.

Ward, W. E., III, and Evans, F. E., Jr., 1975, Coal - its importance to Alabama: Alabama Geological Survey Information Series 53, 26 p.

General report on coal, coal mining, coal production, and land reclamation in Alabama.

Watson, W. T., and Harrison, S. F., 1974, (Revised) Water laws of Alabama: Alabama Geological Survey Bulletin 89, 242 p.

Alabama Water Improvement Commission (A.W.I.C.)

Alabama Water Improvement Commission, 1975, Water quality management plan - Tennessee River basin.

Alabama Water Improvement Commission, 1976, Water quality management plan - Coosa River basin.

Alabama Water Improvement Commission, 1976, Water quality plan - Black Warrior River basin.

These reports include a general inventory of major sources of surface water pollution. Contains review and discussion of climate, existing water quality, water use, physiography, and other environmental components of the basins. Identifies major sources of pollution and government agencies where additional information can be obtained.

Alabama Department of Industrial Relations

Alabama Department of Industrial Relations, 1980, Abandoned mine land reclamation plan, 874 p.

Describes effects of abandoned mine lands on surface water, hydrologic characteristics of major river basins affected by abandoned mine lands, and effects of past mining on aquatic habitats.

Alabama Surface Mining Reclamation Commission (A.S.M.R.C.)

Alabama Surface Mining Reclamation Commission, 1980, Directory of surface mining licensees: 19 p.

Presents information on the organization of the Alabama Surface Mining Reclamation Commission and on licensed coal surface mining companies through September 1980.

U.S. Department of Agriculture (U.S.D.A.)

Forest Service

Despard, T. L., 1980, Geochemistry and petrology of Cobb Coal overburden, northern Warrior Basin, Alabama: U.S. Department of Agriculture, Forest Service, Berea, KY, 221 p.

Contains geologic and chemical analyses of selected over burden coal samples used to determine efficient procedures for regionally evaluating coal overburden in terms of reclamation potential. Data are included from a greenhouse study which correlates the growth response of plants grown in drill-core material to chemical characteristics of the core material.

Soil Conservation Service

Progressive soil survey publications are completed for the following counties in north-central Alabama.

Blount	Lawrence
Cullman	Marion
DeKalb	Marshall
Etowah	Morgan
Fayette	Shelby
Franklin	St. Clair
Jackson	Walker
Jefferson	Winston

Hajek, B. F., Gilbert, F. L., and Steers, C. A., 1975, Soil Associations of Alabama: Auburn University Agronomy and Soils Department series no. 24, 30 p.

_____ 1980, Soil survey of parts of Walker and Jefferson Counties, Alabama, Soil Conservation Service (prepared for U.S. Bureau of Land Management), 95 p.

Lobrecht, Morris, Martin, A., and Lanthrop, B., 1979, Report of sedimentation survey - Lake Lahusage, DeKalb, and Cherokee Counties, Alabama: U.S. Department of Agriculture, Soil Conservation Service, Auburn, Ala., 12 p.

Discusses the storage capacity loss of Lake Lahusage due to sedimentation and the location of sediment within the reservoir. Makes recommendations for prohibiting additional sedimentation and for selecting a location for depositing the lake sediment on land.

U.S. Department of Agriculture, 1974, General soil map, State of Alabama: Soil Conservation Service, Auburn, Ala.

U.S. Army Corps of Engineers

U.S. Army Corps of Engineers, 1969, The incidence and formation of mine drainage pollution, in Report of development of water resources in Appalachia, Appendix C: Appalachian Regional Commission, 251 p.

Discusses the chemistry of acid-mine drainage, its extent and intensity, and analyzes corrective measures to control the problem. Includes descriptive section on the Tennessee and Black Warrior River basins, with mine drainage sources and their effect on water quality.

U.S. Army Corps of Engineers, 1972, Stream mileage tables with drainage areas, 165 p.

_____ 1974, Report on the pollution of Daniel Creek.

Estimates depositional rate of sediment in Daniel Creek basin, Tuscaloosa County. Attributes rate to (1) unconsolidated overburden exposed by mining and (2) placement of spoil banks into or adjacent to the stream channel. Describes degree of impact to stream and public use area.

_____ 1975, Inspection and appraisal of coal mine refuse banks and associated impoundments in the State of Alabama.

U.S. Bureau of Land Management (B.L.M.)

Frentz, H. J., and Lynott, W. P., 1978, Baseline study of climate and air quality of Fayette, Walker, Jefferson, and Tuscaloosa Counties, Alabama: Science Applications, Inc., Report to the Bureau of Land Management (contract No. 1-022-03-080-62), 274 p., U.S. Bureau of Land Management, Tuscaloosa, Ala.

PEDCO Environmental Inc., 1980, Individual site-specific analyses for proposed surface and underground lease tracts for north-central Alabama: (prepared for the U.S. Bureau of Land Management), U.S. Bureau of Land Management, Tuscaloosa, Ala.

Contains air-quality data for proposed coal-lease tracts in north-central Alabama.

Radian Corporation, 1980, Southern Appalachian regional environmental impact statement, north-central Alabama technical report: environmental consequences on climate and air quality (prepared for the U.S. Bureau of Land Management), U.S. Bureau of Land Management, Tuscaloosa, Ala.

Contains investigations of potential impacts on air quality and climate associated with the federal coal leasing program.

U.S. Bureau of Land Management, 1977, Guidelines for reclamation study areas - EMRIA Handbook, 83 p.

_____ 1979, North-central Alabama land use analysis: U.S. Bureau of Land Management, Tuscaloosa, Ala.

Presents an inventory and analysis of the natural, social, and economic resources of Walker, Fayette, Tuscaloosa, and Jefferson Counties, Alabama, where Federal coal reserves are located. Recommends selected tracts of Federally-owned minerals for leasing consideration.

U.S. Bureau of Land Management, 1980, Southern Appalachian regional coal environmental impact statement: U.S. Bureau of Land Managment, 447 p., Tuscaloosa, AL.

A proposal to initiate an active coal leasing program in north-central Alabama, under regulations of the Federal Coal Management Program (43 CFR 3400). Environmental impacts of five leasing alternatives, including a No Action Alternative, are analyzed. Tracts analyzed are located in Fayette, Jefferson, Tuscaloosa, and Walker Counties.

Wood, P. A., and Hajek, B. F., 1979, Characterization of surface soils from five good potential coal leasing areas - Fayette and Tuscaloosa Counties, Alabama: U.S. Bureau of Land Management, Tuscaloosa, Ala.

Contains a map of each of five tracts indicating the potential for suitability of topsoil in surface mined land reclamation. Includes tables by soil series giving the thickness and quality of soil horizons, particle-size distribution of each horizon, pH/lime requirements, organic content, water-holding capacity, and nutrient content.

U.S. Bureau of Mines

Dowd, J. J., and others, 1947, Experiment in the underground gasification of coal, Gorgas, Alabama: U.S. Bureau of Mines Report of Investigation 4164, 62 p.

Gandrud, B. W., and Coe, G. D., 1941, Drainage characteristics of Alabama coal: U.S. Bureau of Mines Report of Investigations 3563, 27 p.

Hertzog, E. S., and others, 1940, Friability, grindability, chemical analyses, and high- and low-temperature carbonization assays of Alabama coals: U.S. Bureau of Mines Technical Paper 611, 59 p.

Schneiner, B. J., and Smelley, A. G., 1980, Water recovery and disposal of clay waste slimes: U.S. Bureau of Mines, 5 p., University, Ala.

Discusses a dewatering technique which allows for clay waste disposal, for reuse of water now lost with clays, and for reclamation of mined land. The technique utilizes a polyethylene-oxide polymer which flocculates and dewaters materials containing clay wastes.

Shotts, R. Q., and Riley, H. L., 1966, Coal resources of the Fabius Flat Rock area, Jackson County, Alabama: U.S. Bureau of Mines Information Circular 8295, 33 p.

Smelley, A. G., Schneiner, B. J., and Zatko, J. R., 1980, Dewatering of industrial clay wastes: U.S. Bureau of Mines, Report of Investigations 8498, 13 p.

U.S. Environmental Protection Agency (E.P.A.)

Barnhisel, R. I., 1977, Reclamation of surface mined coal spoils: U.S. Environmental Protection Agency Report EPA-600/7-77-093, 67 p.

Contains results of a study to evaluate several soil treatments of reclaimed coal mines to improve plant establishment and growth.

Dyer, K. L., 1981, Stream water quality in the coal region of Alabama and Georgia, Part 4 of Water Quality in Appalachia, U.S. Environmental Protection Agency, 65 p. (in press).

Provides water-quality data for small unmined and surface-mined water sheds in twelve counties in Alabama and for three small streams in Georgia. Sites and watershed boundaries are shown on topographic maps.

Grim, E. C., and Hill, R. D., 1974, Environmental protection in surface mining of coal: U.S. Environmental Protection Agency Report EPA-670/2-74-093, 291 p.

Discusses various land reclamation techniques and costs, technology for sediment control, guidelines for coal-haul roads, water quality changes associated with surface mining, preventive and treatment measures, and research needs.

Lyle, E. S., Jr., P.A., and Hajek, B. F., Jr., 1979, Classification of coal surface mine soil material for vegetation management and soil water quality: U.S. Environmental Protection Agency Report EPA-600/7-79-123, 42 p.

Provides classification system of Alabama mine soils based on texture, color value, and pH. Recommendations for application of limestone and fertilizer are given for soils in each mine soil class. A method for calculating potential erodability of mine soils is described and potential erodabilities are calculated for several classes of mine soils.

Martin, H. W., and Mills, W. R., Jr., 1976, Water pollution caused by inactive ore and mineral mines, a national assessment: U.S. Environmental Protection Agency Report EPA-600/2-76-298, 195 p.

Provides information on the scope and magnitude of water pollution from inactive mines. Descriptions of the mineral industry are presented including a summary of economic geology, production methods, and historic mineral production. Mechanisms of formation, transportation, and removal of pollutants are discussed.

Ramani, R. V., and Clar, M. L., 1978, User's manual for premining planning of eastern surface coal mining, Volume 1: Executive Summary: U.S. Environmental Protection Agency Report EPA-600/7-78-180, 81 p.

The first of six volumes which together comprise a manual for premining planning of surface coal mining operations in the eastern United States. Recommends methods, techniques, and alternatives for selecting and designing mining systems.

Scott, L. R., and Hays, R. M., 1975, Inactive and abandoned mines - water pollution prevention and control: U.S. Environmental Protection Agency Report EPA-440/9-75-007, 349 p.

Provides information on the chemistry and geographic extent of mine-drainage pollution in the United States from inactive and abandoned underground mines. Also includes information on underground mining methods and mine-drainage control techniques.

Shotts, R. Q., Sterett, E., and Simpson, T. A., 1978, Site selection and design for minimizing pollution from underground coal mining operations: U.S. Environmental Protection Agency Report EPA-600/7-78-006, 108 p.

Discusses how to select a layout and mining system and operate an underground coal mine with minimal pollution of the environment. Principal factors associated with mining which affect downstream water quality are reported. Recommendations are made with reference to deep mines in Alabama's synclinal coal fields.

Argonne National Laboratory

Daniels, T. F., and others, 1979, A bibliography of selected references on the effects of coal mine pollutants on aquatic ecosystems: Argonne National Laboratory, 252 p.

Contains more than 1,400 references dealing with field and laboratory research on potential toxicities and disturbances known or postulated to be caused by pollutants in coal mine drainage.

Patricoski, M. L., Daniels, L. K., and Sobek, A. A., 1979, A selected bibliography of surface coal mining and reclamation literature, Volume 2, Interior Coal Province: Argonne National Laboratory, 152 p.

Reference source of published literature related to surface coal mining and reclamation in the Interior Coal Province. Contains more than 1,300 references.

Universities

University of Alabama

Dillon, A. C., III, 1976, Rill and gully erosion in spoils from surface mining near Searles, Tuscaloosa County, Alabama: University of Alabama M.S. thesis, 114 p.

Describes slope evolution and quantity of material removed from spoil slopes by rill and gully erosion. Discusses erosional rates and stages, slope classifications, and methods of estimating erosion based on divide and gully areas.

Gill, K. A., Halcomb, G. L., and Littrell, B. L., 1980, The effects of acid mine drainage upon aquatic macroinvertebrate communities: University of Alabama unpublished report, 11 p.

Presents biological data from three tributaries of Yellow Creek, Tuscaloosa County, Ala.

Hughes, T. H., 1975, Erosion sedimentation and mine drainage, in Orientation session on surface mining for the legislature of Alabama: University of Alabama Mineral Resources Institute, p. 31-43.

Hughes, T. H. and others, 1976, Assessment of the practicality of remote sensing techniques for a study of the effects of strip mining in Alabama: University of Alabama, 175 p.

Correlated aerial photographs with field studies of two surface-mined areas in Tuscaloosa and Walker Counties. Discusses the extent of mining, status of revegetation and reclamation, amounts of erosion and sedimentation, and extent of mine-drainage pollution.

McGuire, R. A., Jr., 1975, An investigation into the predictability of the wastes in drainage from stripmine surface areas as functions of time and storm water flow: University of Alabama M.S. thesis.

Proceedings of the Third Annual Mining Institute, April 15-17, 1980: University of Alabama.

Includes presentations on coal markets and productivity, regulation updates, and current technologies in surface and underground coal mining.

Stokes, Eric, 1977, Water chemistry survey of Corona Mine: University of Alabama M.S. thesis.

Ward, W. E., 1977, Jointing in a selected area of the Warrior coal field, Alabama: University of Alabama M.S. thesis, 61 p.

Describes jointing and structural history of the Warrior field.

Winefordner, J. S., 1949, Geology and mineral resources of University of Alabama property and adjoining area in the vicinity of Rockhouse Creek, Tuscaloosa and Jefferson Counties, Alabama: University of Alabama M.S. thesis, 46 p.

Auburn University

Gray, T. D., 1981, Depositional systems of the Upper Cliff coals in a portion of the Plateau coal field, Alabama: Auburn University M.S. thesis, 119 p.

Describes aerial distribution, depositional history, and petrographic relationships of the Upper Cliff coal seams in the Pottsville Formation in parts of Marshall, Jackson, and Blount Counties, Alabama. Also provides lithologic data and megafloral analyses.

University of Kentucky

Ferm, J. C., 1981, A study of geologic factors influencing reclamation of Federal coal-bearing lands in northern Alabama: University of Kentucky, Lexington, Ky., 337 p.

Describes mineralogical-geochemical properties, plant growth, and fertilizer treatments of commonly occurring rocks in areas of potential surface mining of Federal lands.

Ferm, J. C., and Weisenfluh, G. A., 1981, Cored rocks of the southern Appalachian coal fields: University of Kentucky, Department of Geology, 93 p.

Illustrates, with color photographs, cores of common rock types in the southern Appalachian coal fields. Cores are grouped into major rock classes with a description of properties within the class. Also provides information on the recognition of rock types.

University of Tennessee

Martin, Ray, 1965, Geology of a portion of Franklin, Marion, and Winston Counties, Alabama: University of Tennessee M.S. thesis, 59 p.

Minear, R. A., ed., 1978, Proceedings - Symposium on environment and mining research and demonstration activities in southern Appalachia: Appalachian Resources Project no. 52, University of Tennessee.

Contains research abstracts on environmental impacts and consequences of coal mining in southern Appalachia, including Alabama.

University of Mississippi

Broussard, M. C., 1978, Chester depositional systems (Upper Mississippian) of the Black Warrior basin: University of Mississippi M.S. thesis, 164 p.

Louisiana State University

Hobday, D. K., 1969, Upper Carboniferous shorelines systems in northern Alabama: Louisiana State University Ph.D. dissertation.

Other

Bengtson, G. W., and Mays, D. A., 1978, Growth and nutrition of loblolly pine on coal mine spoil as affected by nitrogen and phosphorus fertilizer and cover crop: Forest Science 24(3), p. 398-409.

Bengtson, G. W., Mays, D. A., and Allen, J. C., 1973, Revegetation of coal spoil in northeastern Alabama: Effects of timing of seeding and fertilization on establishment of pine-grass mixtures: Research and Applied Technology Symposium on Mined Land Reclamation Proceedings, Pittsburgh, PA, March 7-8, p. 208-214.

Bituminous Coal Research, Inc., 1975, Reclamation of coal-mined land, a bibliography with abstracts: 188 p.

Includes publications covering aspects of reclamation from legislation to mined-land use and management.

Broussard, M. C., and Cleaves, A. W., 1979a, Chester (Upper Mississippian) depositional systems of the Black Warrior in Abstracts with programs: Geological Society of America, Southeastern Section, v. II, no. 4, p. 172.

_____ 1979b, Upper Mississippian deltas of the Black Warrior basin of Mississippi and Alabama (abs.): Gulf Coast Association Geological Society Transactions, v. 26.

Coal Mining Process, 1972, Steeply pitching seams challenge Alabama stripping: v. 9, no. 10, p. 50-53.

Describes strip-mining operation and reclamation program in Shelby County and adjacent areas.

Cornforth, C., 1974, Alabama operators organize for better reclamation: Coal Mining Process, v. II, no. 7, p. 41-42, 51-53.

Provides information for the Alabama Surface Mining Reclamation Council founded in 1972. Operators organized to set their own reclamation standards to reclaim their mined lands. Describes the council's investment in a 5-year research grant to attain their goals. The grant was awarded to the Auburn University Agricultural Experiment Station.

Crane, W. R., 1905, The Pratt Mines in Alabama: Engineering and Mining Journal, v. 79, p. 177-180.

Cudworth, J. R., 1928, Report of the geology and mineral resources of the Tennessee River district in Alabama, Georgia, and Mississippi: U.S. 70th Congress, 1st session, House Document 185, Appendix C, Coal, p. 169-171, 177-178.

Davis, M. W., and Ehrlich, R., 1974, Late Paleozoic crustal composition and dynamics in the southeastern United States in Briggs, Carrett, ed., Carboniferous of the southeastern United States: Geological Society of America Special Paper 148, p. 171-186.

Dillon, A. C., Masingill, J. H., and White, J. R., 1973, Erosion rates of selected Cretaceous and Quaternary sediments in Tuscaloosa County, Alabama (abs.): Alabama Academy of Science, April, 1973.

Donaldson, A. C., 1969, Ancient deltaic sedimentation (Pennsylvanian) and its control on the distribution, thickness, and quality of coals in Donaldson, A. C., ed., Some Appalachian coals and carbonates: models of ancient shallow water deposition: West Virginia Geologic Survey, 384 p.

Ferm, J. C., 1974, Carboniferous environmental models in eastern United States and their significance, in Briggs, G., ed., Carboniferous of the southeastern United States: Geological Society of America Special Paper 148, p. 79-96.

_____ 1976, Depositional models in coal exploration and development, in Saxena, R. S., ed., Sedimentary environments and hydrocarbons: American Association of Petroleum Geologists Short Course, New Orleans, Louisiana, May 26, 1976, p. 60-78.

Ferm, J. C., Milici, R. C., and Eason, J. E., 1972, Carboniferous depositional environments in the Cumberland Plateau of southern Tennessee and northern Alabama: Tennessee Division of Geology, Report Investigation 33, 32 p.

Fies, M. H., 1924, Alabama coal mining practices: American Institution of Mining Metallurgy Engineers Technique Paper 1370C, 51 p.

Frazer, P., Jr., 1891, The Warrior coal field of northern Alabama: American Geologist, v. 7, p. 305-320.

Georgia Department of Natural Resources, Environmental Protection Division, 1978, The impact of strip coal mining on a northwest Georgia stream - East Fork of Little River (Coosa River Basin): 48 p.

Presents physical, chemical, and biological data for Lake Lahusage (DeKalb County, Alabama) and discusses the impact of strip coal mining in the East Fork watershed.

Gleason, V. E., 1978, A bibliography on disposal of refuse from coal mines and coal cleaning plants - Coal and the Environment Abstract Series: Bituminous Coal Research, Incorporated, 182 p.

Subjects include the analysis and characterization of coal refuse; various methods of handling, storing, and disposing of coal refuse; environmental problems such as refuse drainage quality; control of environmental problems; and uses for coal refuse.

Gleason, V. E., and Russell, H. H., 1976, Mine drainage bibliography 1910-1976: Bituminous Coal Research, Incorporated, 288 p.

References listed are for studies relating to surface and underground mines, active and abandoned mines, reclaimed surface mines, planning of new mines, lakes formed by surface mining, drainage from coal refuse, and water from coal preparation plants.

Haggen, H. D., 1975, Special problems and aspects of surface mining in Alabama, in Boyer, J. F., ed., Third Symposium on Surface Mining and Reclamation, Louisville, Kentucky, October 21-23, Proceedings, v. I, p. 13-15.

Hains, C. F., 1973, Floods in Alabama, magnitude and frequency: Alabama Highway Department, 174 p.

Haynes, R. J., and others, 1979, Environmental impacts of coal extraction in Alabama: 1978-1985, ORNL-6793, Oak Ridge National Laboratory, Oak Ridge, Tennessee, 223 p.

Reviews mining techniques and impacts, identifies current and future coal mining according to potential methods of extraction, and discusses potential environmental impacts of, and constraints to, future coal extraction.

Lyle, E. S., Jr., and Evans, E. M., 1979, Revegetation of Alabama coal surface mines for soil cover and forage production: Reclamation Review, v. 2, no. 2, p. 55-62.

Lyle, E. S., Jr., and others, 1976, Some vegetation and soil characteristics of coal surface mines in Alabama, in National Coal Association and Bituminous Coal Research, Inc., Surface Mining and Reclamation, Fourth Symposium Reprints, Louisville, Ky., Oct. 19-20, 1976, p. 140-152.

Evaluates six unreclaimed mines to develop quantitative information on soils and vegetation found on abandoned coal surface mines. Includes data for average tree age, timber volume per acre, overstory and understory species, and soil samples.

Malatino, A. M., 1979, Sedimentation affecting the natural life of a lake in the Warrior River basin within Tuscaloosa County, Alabama (abs.) in Mason, W. H., ed., Alabama Academy of Science 56th Annual Proceedings, 1979: Alabama Academy of Science Journal, 50(3), p. 134.

Mays, D. A., and Bengtson, G. W., 1974, Fertilizer effects on forage crops on strip mined land in northeastern Alabama: Tennessee Valley Authority Bulletin Y-74, National Fertilizer Development Center, Muscle Shoals, Ala., 23 p.

National Research Council, 1981, Surface mining: soil, coal, and society, (report for U.S. Bureau of Mines) National Academy Press, Washington, DC.

Report concludes that soil reconstruction after mining cannot be expected to recreate or preserve characteristics of pre-mine soil, but should restore or improve plant rooting depth and availability of water or nutrients. Also concludes that "land use should be reclaimed to the contour most advantageous for its final use, regardless of whether this contour is the original contour."

Olem, Harvey, 1980, Coal and coal mine drainage: Journal of the Water Pollution Control Federation, v. 52, no. 6, p. 1415-1429.

Literature review and discussion of coal-related bibliographies, coal mining, coal cleaning, and coal transportation and storage. Contains reference list on subjects.

Olin, D. A., and Bingham, R. H. 1977, Flood frequency of small streams in Alabama: Alabama Highway Research HPR no. 83, 44 p.

Gives equations for estimating future floods for 2-, 5-, 10-, 25-, 50-, and 100-year recurrence intervals on natural streams in Alabama with drainage areas of 1 to 15 square miles. One equation for each recurrence interval applies statewide.

Pettry, D. E., Miller, W. F., and Darden, J. W., 1980, Reclamation of the Knob surface mine, Alabama, using selected overburden material: Symposium on Surface Mining Hydrology, Sedimentology and Reclamation, Dec. 1-5, 1980, University of Kentucky, Lexington, Ky.

Describes reclamation and vegetation of mine spoil area using selected overburden materials. Undisturbed soils and selected spoil materials were evaluated and sampled using positional transect techniques.

Richardson, J. M., and Padgett, H. P., 1956, General description of the geology of the coal measures of Alabama, in Alabama Almanac and Book of Facts: Birmingham, Alabama, Vulcan Press, p. 198-209.

Robinson, L. C., ed., 1976, A field guide to Carboniferous littoral deposits in the Warrior Basin: Guidebook, American Association of Petroleum Geologists Field trip, New Orleans Geological Society, 80 p.

Shotts, R. Q., 1953, A report on reserves in a part of the Warrior coal field in Alabama: Tennessee Valley Authority unpublished report, 53 p.

_____ 1956a, A compilation of complete analyses of Alabama coals published since 1925, Warrior and Plateau fields: Alabama State Mine Experiment Station Bulletin 6, 31 p.

_____ 1956b, Further studies of the rank and composition of Alabama coals analyzed by the U.S. Bureau of Mines since 1925: Alabama Academy of Science Journal, v. 28, p. 44-61.

_____ 1960, Correlations in the "Coal measures" of the southeast: Alabama Academy of Science Journal, v. 31, p. 427-446.

_____ 1967, The Utley coal bed in the western Warrior field: Alabama Academy of Science Journal, v. 38, no. 3, p. 202-214.

Stearn, R. G., and Mitchum, R. M., 1962, Pennsylvanian rocks of southern Appalachians, in Branson, C. C., ed., Pennsylvanian system in the United States, a symposium: American Association of Petroleum Geologists, Tulsa, Okla., p. 74-96.

Stokes, Eric, 1978, Mine drainage study for Walker-Fayette Coal Co., Oakman, Alabama: Tuscaloosa Testing Laboratory, Incorporated, unpublished report, Tuscaloosa, Ala.

U.S. Department of Commerce, 1961, Rainfall frequency atlas of the United States: Weather Bureau Technical Paper no. 40, 115 p.

Upshaw, C. F., 1967, Pennsylvanian palynology and age relationships in the Warrior basin, Alabama, in Ferm, J. C., Ehrlich, R., and Neathery, T. L., eds., A field trip to Carboniferous detrital rocks in northern Alabama: Geological Society America, Coal Division Annual Field Trip Guidebook, p. 16-20.

Vestal, F. E., and Mellen, F. F., 1936, The coal of northern Alabama, report on a survey made for the Tennessee Valley Authority: Tennessee Valley Authority unpublished report, 90 p.

West Alabama Planning and Development Council, 1979, Coal - Impact Survey: East Tuscaloosa County: 22 p.

Contains information on the impact of expanded coal production in east Tuscaloosa County to provide guidelines to local governments for accomodating resulting growth in industrial, residential, and commercial sectors. Includes maps showing geology, percent of slope, topography, mine sites, and water service areas.

U.S. Geological Survey

Alabama (State)

Shows counties, location and names of all cities and towns, railroads, and township and range lines in black. Also shows rivers, many of the smaller streams, and other water features in blue. Scale 1:500,000.

Alabama (Topographic)

Overprint of 1:500,000 base map of Alabama (State) that also shows highways and contours. Also shows national parks, national forests, and wildlife refuges by color patterns.

Alabama (Relief)

Map is overprinted on a modified base map which shows the State capital, county seats, State and county boundaries in black, and water features in blue. Physical features on the map are brought out by shaded-relief in color.

Appalachian Region, as designated by the Appalachian Regional Commission.

Shows State and county boundaries and names, State capitals and county seats in black, water features in blue. Overprints show national parks and monuments, national forests, national wildlife refuges, and Indian reservations. Scale 1:2,500,000.

Lookout Mountain sheet (NI-16) of the International Map of the World

Shows part of Alabama, Arkansas, Georgia, Mississippi, North Carolina, and Tennessee. The altitude of the land is shown by contour lines and tints. Limiting parallels, 32° and 36°. Limiting meridians 84° and 90°. Scale 1:1,000,000.

Topographic Maps Illustrating Specified Physiographic Features

Set of 100 maps were selected to illustrate a wide variety of physiographic features within most of the 86 sections or subdivisions shown on the Physical Divisions Map of the United States, 1955. An index map showing the name and location of the maps and aerial photographs that are available from Federal agencies for these areas may be obtained on request to the U.S. Geological Survey.

Status Index Maps

Maps showing topographic mapping completed and the status of various phases of mapping and areas covered by aerial photography in the United States are available free on request to the U.S. Geological Survey, Reston, VA 22092. Scale 1:5,000,000. Topographic maps can be obtained from the following sources.

Geological Survey Sales Offices

Maps may be purchased over the counter or by mail order from:

Branch of Distribution
U. S. Geological Survey
1200 South Eads Street
Arlington, VA 22202.

A limited stock of the standard topographic quadrangle maps is maintained for over-the-counter sales only at:

1028 General Services Building
19th and F Streets, NW
Washington, DC 20405

Public Inquiries Office
USGS National Center
Room 1C402
Reston, VA 22092

Map Reference Libraries

Many libraries maintain reference files of the published maps of the U.S. Geological Survey. In Alabama, the maps are deposited in the libraries listed below:

TUSCALOOSA:

Library, Alabama Geological Survey
Library, University of Alabama

AUBURN:

Library, Auburn University

Dealers for Topographic Maps

Many maps described in the index are stocked and sold over the counter by the dealers listed below. Dealers' prices may be higher than Survey prices.

Alabama

Birmingham:

Birmingham Blue Print Co., 3000 Third Avenue South.[1/]

Electric Blue Printing Co., Inc., 310 North Twenty-first Street.

Patton-Harris-Dudley, Inc., 5340 First Avenue North.

Resource Management Service, Highway 280, South.

Star Hardware & Supply, 1318 2nd Avenue North.

Decatur:

The Campsite, Morningside Shopping Center, 1806 11th Street, SE.

Dothan:

Peacock Surveyors, Inc., Branon Stand-Taylor Road, Rt. 1 Box 1923.

Fort Payne:

Ladd Engineering Associates, Inc., 505 Third Street SE.

Huntsville:

Atlantic Aerial Surveys, Inc., 803 Franklin Street.

The Outdoor Omnibus Inc., Heart of Huntsville Shopping Mall.

Jasper:

Title Guaranty Co., Inc., 3rd Avenue and 19th Street.

Tuscaloosa:

Publications Sales, Alabama Geological Survey, P.O. Drawer 0, University, Alabama.

1/ The use of a corporate name in this report is for identification purposes only and does not imply endorsement by the U.S. Geological Survey.

U.S. Bureau of Land Management (BLM)

Because the character of Federal Mineral Ownership (FMO) is so complex, and because of increased energy demands, BLM initiated in 1974 what has become known as the Federal Minerals Management Mapping Program (FMMMP), to develop maps of both surface and subsurface mineral ownership in areas of known energy resources, coal, oil and gas, oil shale, and so forth. The maps are published at a scale of 1:100,000. Maps covering the Warrior and Plateau coal fields are available at the following offices:

Bureau of Land Management
Eastern States Office
350 South Pickett Street
Alexandria, VA 22304

Bureau of Land Management
Tuscaloosa Project Office
518 19th Avenue
Tuscloosa, AL 35401

Branch of Distribution, Eastern Region
U.S. Geological Survey
1200 South Eads Street
Arlington, VA 22202

U.S. Department of Agriculture

Forest Service

Topographic, road, and other types of maps are available from:

National Forests in Alabama
Forest Supervisor
U.S. Forest Service
P. O. Box 40
Montgomery, AL 36101

Soil Conservation Service

Soil Conservation Service, 1977, Prime Farmland Map of Alabama.

Shows categories of farmland based on percent prime farmland. Criteria used to define prime farmland are soil moisture, annual soil temperature, and other soil characteristics.

____ Soil Survey Maps by county.

Soil survey maps in the Warrior and Plateau coal fields are available on a county basis. All counties, with the exception of Winston, have published soils maps, maps awaiting publication, or soils surveys in progress. Local Soil Conservation Service offices should be contacted regarding availability or status of soil mapping.

NAWDEX

The National Water Data Exchange (NAWDEX) is a national confederation of 119 organizations - 22 Federal, 38 State, 19 local governmental, 4 interstate, 28 academic, 7 private, and 1 foreign organization -- that represent nearly all sectors of the water-data community.

The automated system contains the Master Water Data Index (MWDI) file, which serves as a central index to water data held by members who voluntarily contribute data. NAWDEX can assist any organization or individual in identifying and locating needed data and refer the requester to the member organization that retains the data required.

Services are available through a Program Office located at the U.S. Geological Survey's National Center in Reston, Virginia, and a nationwide network of Assistance Centers located in 45 States and Puerto Rico, which provide local and convenient access to NAWDEX facilities. A directory is available on request that provides names of organizations and persons to contact, addresses, telephone numbers, and office hours for each of these locations [Directory of Assistance Centers of the National Water Data Exchange (NAWDEX), U.S. Geological Survey Open-File Report 79-423 (revised)].

A user's manual entitled "National Water Data Exchange (NAWDEX) System 2000 Data Retrieval Manual" is available from the U.S. Geological Survey National Center (see address below). The manual contains general instructions on the use of System 2000 to retrieve any type of data and specific instructions on how to retrieve data from the U.S. Geological Survey's Water Data Sources Directory (WDSD) and Master Water Data Index (MWDI) Data Bases.

For additional information concerning the references described, the NAWDEX program, or its services, contact:

Program Office
National Water Data Exchange (NAWDEX)
U.S. Geological Survey
421 National Center
12201 Sunrise Valley Drive
Reston, VA 22092
Telephone: (703) 860-6031
FTS 928-6031

or

NAWDEX
U.S. Geological Survey
Water Resources Division
520 19th Avenue
Tuscaloosa, AL 35401
Telephone: (205) 752-8104
FTS 229-2957
Hours: 7:30 to 4:00 Central Time

STORET

STORET is a computerized data base system maintained by the U.S. Environmental Protection Agency for the storage and retrieval of water-quality information. Includes a wide range of chemical and physical parameters from various monitoring programs. Several agencies conducting water monitoring programs in Alabama coal fields submit data to the STORET system. Full details on the use of the STORET system are given in the STORET handbook entitled "Water Quality Control Information System (STORET)," EPA, Washington, DC 20460, November 1971.

WATSTORE

The National Water Data Storage and Retrieval System of the U.S. Geological Survey (WATSTORE) provides computerized procedures and techniques for processing water data to provide for more effective and efficient management of its data-releasing activities. It consists of several independent files as follows: (1) surface-water, water-quality, and ground-water data measured on a daily or continuous basis; (2) annual peak values for streamflow stations; (3) chemical analyses for surface- and ground-water sites; (4) water parameters measured more frequently than daily; and (5) geologic and inventory data for ground-water sites.

The system is operated and maintained on the central computer facilities of the Survey at its National Center in Reston, Virginia. Data may be obtained from WATSTORE through the Water Resources Division's 46 district offices. Information pertaining to WATSTORE is contained in seven volumes of the WATSTORE User's Guide, available from the National Center. General inquiries about WATSTORE and authorization to use WATSTORE via a selected user terminal may be obtained by writing to:

Chief Hydrologist
U.S. Geological Survey
437 National Center
Reston, VA 22092

or

U.S. Geological Survey
Water Resources Division
520 19th Avenue
Tuscaloosa, AL 35401

WRSIC

WRSIC is an extensive bibliographic data service relating specifically to water resources activities known as the Water Resources Scientific Information Center. This system is maintained by the Department of the Interior's Office of Water Research and Technology and currently has over 125,000 bibliographic references on water-related subjects, including coal hydrology. The U.S. Geological Survey, Water Resources Division, can provide access to this system either through the NAWDEX Program Office in Reston, Virginia, or through Local Assistance Centers. Further information on the WRSIC file is available in the Office of Water Research and Technology (1975) publication entitled Searching Water Resources Literature by Computer, OWRT/WRSIC 75-001.

WATER MONITORING PROGRAMS IN ALABAMA

U.S. Geological Survey, Water Resources Division

Comprehensive water monitoring network with about 350 sites located in the Warrior and Plateau coal fields in north-central Alabama. A complete listing of sites and data collected from them are published annually in "Water Resources Data for Alabama". Current "coal" activities in Alabama are:

1. PROJECT: AL 76-041

PROJECT TITLE: Hydrologic surveillance of potential mining areas in Warrior coal field, Alabama.

OBJECTIVE: The collection and interpretation of basic data on water resources to aid in the Bureau of Land Management's preparation of environmental impact statements and its planning and management of Federal coal reserves.

2. PROJECT: AL 79-042

PROJECT TITLE: Hydrologic assessment of coal areas in support of Public Law 95-87, for parts of the South Atlantic-Gulf and Tennessee regions in Alabama.

OBJECTIVE: To design a water monitoring network in actual or potential coal mining areas for each of 14 hydrologic units, to later increase and upgrade the existing network, to coordinate basic data acquisition, and to analyze, interpret, and publish coal hydrology data.

General inquiries about water monitoring programs of the U.S. Geological Survey may be directed to:

District Chief
U.S. Geological Survey, Water Resources Division
520 19th Avenue
Tuscaloosa, AL 35401

Geological Survey of Alabama

Has a study in the Warrior Basin assessing the relationship between strip-mined areas and surface and ground water quality. Projections on future surface mining and estimations of impacts on water quality will also be made for the period 1981 to 1990. Similar research will be done on projections to the year 2020. General inquiries about water monitoring programs of the Geological Survey of Alabama may be directed to:

State Geologist
Geological Survey of Alabama
Oil & Gas Board Building
P. O. Drawer O
University, AL 35486

Alabama Water Improvement Commission

Operates ten surface-water trend stations in the coal regions of north-central Alabama. Coal related activity also includes emphasis on compliance by surface mining operations with pollution control regulations and permit conditions and issuance of discharge permits for surface mining treatment operations. Further information may be obtained from:

Alabama Water Improvement Commission
Gunter Industrial Park
2721 Gunter Park Drive, West
Montgomery, AL 36130

U.S. Environmental Protection Agency

Maintains a water-quality monitoring network of 82 stations. A number of these are base-line stations at which a wide range of physical and chemical parameters are monitored. Data are stored in EPA's STORET Computer System. Further information may be obtained from:

U.S. Environmental Protection Agency
401 M Street SW
Washington, DC 20460

SOURCE AGENCIES AND ORGANIZATIONS

More than 50 industries, universities, consultants, and government agencies were contacted for information on reclamation practices and coal hydrology work in the Warrior and Plateau coal fields. The personal contacts are grouped as follows: Industry, Universities, Federal government, and State government. Selected sources and type of work or research, where provided, for which information would be available, follows.

Industry

Surface coal mine land reclamation practices in Alabama have been altered in response to requirements defined in the Surface Mining Control and Reclamation Act of 1977 (PL 95-87). Water quality assessment and monitoring is required before and during mining. The monitoring may involve sediment ponds, streams, and wells. Similar monitoring may be required at underground mines.

Listed below are some of the industry contacts and summaries of selected reclamation practices reported.

Allen Massey, Chief Engineer
Cobb Coal Company
P. O. Box 126
Carbon Hill, AL 35549
Telephone: (205) 924-4291

Continuous monitoring of spoil ponds and bimonthly monitoring of about six wells for water quality. Reclamation practices include grain-drill reseeding of grasses in the summer and hand planting pine seedlings in the winter. Various types of hardwood and fruit trees have been planted on reclaimed areas of some mines. One mine was also reclaimed leaving a pond which has been stocked with fish and is open to the public.

Perry Hubbard, Engineer
Drummond Coal Company
P. O. Box 1549
Jasper, AL 35501
Telephone: (205) 387-0501

The Drummond Coal Company monitors about 50 sites on streams and about 130 sediment basins on a monthly basis and about 60 wells on a semiannual basis. Data is also collected at 10 rain gages. Surface water computer modeling and erosion control work for some mines is done by consultants.

Robert Lynch, Geologist
North River Energy Corporation
234 Vestavia Center
U.S. Highway 82 West
Northport, AL 35476
Telephone: (205) 345-1624

Monitoring program includes the collection of 25 water-quality samples a month from streams in active surface and subsurface mine areas.

Dr. Jerry A. Files
Stovall-Files Coal Co., Inc.
P. O. Box 359
Carbon Hill, AL 35549
Telephone: (205) 924-4371

Reclamation work includes water quality data collection at four sediment ponds on a bimonthly basis.

David George, Joseph Love
Walker Fayette Coal Company (Ark Land)
P. O. Box 1688
Jasper, AL 35501
Telephone: (205) 622-3301

In addition to required reclamation work, revegetation and erosion control studies using various mulch covers on control plots of spoil material are being made near Oakman, Alabama.

James Darden, Wendell Beavers, Jack McDuff
Alabama By-Products Corp.
P. O. Box 10246
Birmingham, AL 35202
Telephone: (205) 252-5171

Reclamation work includes revegetation of spoil areas using selected overburden material instead of topsoil.

Universities

University of Alabama (UOA)
University, AL 35486

Department of Civil Engineering: (205) 348-6550

Harold Henry - ongoing research using Hydrologic Simulation Package (Corps of Engineers) and Stanford Watershed Model. Applicable to urban hydrology but will be involved in modeling coal basins to help mining companies meet regulations. Programs used are HEC_1 and HEC_2.

Henry Whittle - WATEQ modeling with possible future applications to mined basins. Program is used for calculating chemical equilibria in surface waters.

Department of Chemical and Metallurgical Engineering: (205) 348-6450

Charles Wilkins - (1) coking coals - study with R. Q. Shotts on the suitability of low-sulfur coals for metallurgical coke; (2) ground-cover types - research on various types of paper pulp waste and metallurgical slag as artifical topsoils and surface stabilizers in reclamation areas.

Department of Geology: (205) 348-5095

Travis Hughes and Gary Hooks - rill and gully erosion and sheet erosion work on small basins on Drummond Coal Company property near Brookwood, Alabama. Trying to modify the universal soil-loss equation for strip mining. Also working in cooperation with Argonne National Laboratory.

Mineral Resources Institute - State Mine Experiment Station:
(205) 348-5452

Reynold Q. Shotts - survey of coking coals - study on the suitability of low-sulfur coals for metallurgical coke.

Department of Biology: (205) 348-5960

Earl Cross - involved in (1) feasibility studies of commerical erosion-control material on surface mined sites (Walker-Fayette Coal Co., Oakman, Alabama), such as silk fencing, plastic matting and (2) revegetation studies and erosion control using various mulch types on mine spoil material.

Fred Gabrielson - two projects presently in Eastern Land Reclamation Project - (1) concerns watershed hydrology of various reclamation techniques to determine effects on small watersheds; and (2) defining empirical relationships among overburden properties, the hydrologic cycle, mine spoil properties, revegetation success, and post-mining land use at the Kellerman Mine (Tuscaloosa County, Alabama). See Argonne National Laboratory.

Dwight Bradshaw - works on the Eastern Land Reclamation Project and is also involved in a spoil-pond project in which water-meal (Wolffia) is seeded in spoil ponds to improve water quality.

University of Alabama at Birmingham (UAB)
Birmingham, Alabama

Department of Engineering: (205) 934-4426

James Dinger - has completed research to assess the cost of water-quality monitoring at surface-mine reclamation sites in Alabama to meet regulations imposed by P.L. 1197.

Auburn University
Auburn, Alabama

Department of Forestry: (205) 826-4050

E. S. Lyle, Jr. - in planning stage of research on soil moisture differences between mined and unmined sites.
Department of Soil and Agronomy: (205) 826-4100

W. F. Miller - surface-mine soil reclamation research at the Agricultural Experiment Station, Auburn, Alabama.

B. F. Hajek - has characterized surface soils from five potential coal-leasing areas in Fayette and Tuscaloosa Counties, Alabama, for the U.S. Bureau of Land Management

Mississippi State University
Mississippi State, Mississippi

Departments of Agronomy and Forestry

David Pettry (Department of Agronomy) and W. F. Miller (Department of Forestry) - completed reclamation study of a spoil area at Knob Mine, Jefferson County, Alabama using selected overburden material. Also have proposed a 3 to 4 year study in northern Alabama related to Restoration-Reclamation Act.

Federal Government

Agencies involved in coal hydrology activities in Alabama:

U.S. Department of Interior

Office of Surface Mining
Jasper Field Office
Central Bank Building
Third Floor, Suites B & C
Jasper, AL 35501
Contact: Robert Prebeck, Reclamation Specialist
Telephone: (205) 221-9632

Inspects surface mines and reclaimed areas and samples soils to detect high acidity.

U.S. Geological Survey
Water Resources Division
520 19th Avenue
Tuscaloosa, AL 35401
Contact: Robert Kidd
Telephone: (205) 752-8104

See section on Water Monitoring Programs, USGS

U.S. Geological Survey
Water Resources Division
8600 LaSalle Road
208 Carroll Bldg.
Towson, MD 21204
Contact: David Grason
Telephone: (301) 828-1535

Involved in a guide report for evaluating the hydrology of major federal coal lands in seven eastern states. Sources of available information and recommendations for future studies. States include Illinois, Indiana, Kentucky, Ohio, Tennessee, Virginia, and West Virginia.

U.S. Geological Survey
Conservation Division
1725 K Street NW, Suite 204
Washington, DC 20006
Contact: Ronald Law
Telephone: (202) 254-5120

Ground water monitoring project in the Warrior coal field.

U.S. Bureau of Land Management
518 19th Avenue
Tuscaloosa, AL 35401
Contact: Robert Todd, Office Manager
Telephone: (205) 759-5441

Initiated an environmental assessment in north-central Alabama as part of an overall Federal coal management program. The focus of the study is in Fayette, Jefferson, Tuscaloosa and Walker Counties, where there are more than 70,000 acres of Federal coal rights (see Documents and Reports, BLM).

U.S. Bureau of Mines
P. O. Box L
University, AL 35486
Contact: Jerry McClendon
Telephone: (205) 758-0491

Completed a report on strip-mine land reclamation (see Documents and Reports, National Research Council). Is also involved in locating abandoned underground coal mines and a study on subsidence caused by underground mining in Graysville, Alabama.

U.S. Environmental Protection Agency (EPA)
345 Courtland Street, NE
Atlanta, GA 30308
EPA has toll-free Public Awareness Office
Telephone: 1-800-241-1754

Currently monitors some surface-water sites in north-central Alabama. Data are stored in the STORET computer system.

U.S. Department of Agriculture

Soil Conservation Service (SCS)
P. O. Box 311
Auburn, AL 36830
Contact: Ernest V. Todd, State Conservationist
Telephone: (205) 821-8070, Ext. 535

Soil Conservation Service
1118 Greensboro Avenue, Room 208
Federal Building
Tuscaloosa, AL 35401
Contact: James McCullough, Regional Conservationist
Telephone: (205) 759-4716

The SCS is actively involved with the Rural Abandoned Mines Project (RAMP) in north-central Alabama. Committed to reclaim four abandoned sites at or near Smith Lake, Harris Lake, Mila Lawrence and Oakman.

Forest Service

Northeastern Forest Experiment Station
204 Center Street
Berea, KY 40403
Contact: W. R. Curtis or K. L. Dyer
Telephone: (606) 986-8431

Sampling and compilation of water-quality data for 58 small basins in north Alabama as part of a study of the effects of surface mining on water quality in Appalachia. Primary objective of the study is the establishment of a data base for small first-order watersheds.

Mineralogy and greenhouse studies have been made on cores from the Warrior basin in Tuscaloosa, Fayette, and Walker Counties, Alabama, as part of a study for BLM.

Tennessee Valley Authority
Division of Water Resources
248 401 Building
Chattanooga, TN 37401
Contact: Harvey Olem
Telephone: (615) 751-0011

Tennessee Valley Authority
Division of Land and Forest Resources
Norris, TN 37828
Contact: Thomas Zarger
Telephone: (615) 856-6450

Surface water data is available for Upper Bear Creek basin in north-western Alabama, where a sedimentation problem in a recreational reservoir has been related to mining.

Most field studies on reclamation by TVA have been done on Sand Mountain in extreme northeastern Alabama by their Soils and Fertilizer Research Branch (see Mays and Bengtson, 1974).

Biological research on morphological abnormalities in midge larvae in Alabama strip mine ponds has been completed by Dr. Kenneth J. Tennessen, TVA, Muscle Shoals, Alabama.

U.S. Department of Energy

Argonne National Laboratory
Land Reclamation Program
9700 South Cass Avenue
Argonne, IL 60439
Contact: Andrew Sobeck
Telephone: (312) 972-3358

Research conducted at the Drummond Coal Company's Kellerman Mine includes a geologic survey, hydrologic analysis, mine-soil survey, and erosion analysis. Empirical relationships between overburden, hydrology, mine-soil, revegetation, and post-mining land use will be determined.

State Government

Agencies involved with water quality in Alabama:

Alabama Water Improvement Commission (AWIC)
State Office Bldg.
Montgomery, AL 36130
Contact: Kenneth McDowell, Pollution Control Specialist
James McIndoe, Water Quality Planning
Telephone: (205) 277-3630

Alabama Department of Public Health
Environmental Health Administration
Division of Solid Waste & Vector Control
State Office Building
Montgomery, AL 36130
Contact: Cecil Cork, Director
Telephone: (205) 277-3630

Alabama Department of Public Health
Environmental Health Administration
Division of Public Water Supplies
State Office Building
Montgomery, AL 36130
Contact: Joseph Downey, Director
Telephone: (205) 832-3170

Alabama Department of Conservation & Natural Resources
Room 702, Administration Building
64 North Union Street
Montgomery, AL 36130
Contact: Commissioner
Telephone: (205) 832-6361

Alabama Surface Mining Reclamation Commission (ASMRC)
2nd Floor, Central Bank Building
1811 Second Avenue
P. O. Box 2390
Jasper, AL 35501
Contact: John Cranor, William Harris
Telephone: (205) 221-4130

Small Operator Assistance Program (SOAP) data and other mine data will be placed in the STORET system.

Geological Survey of Alabama
Oil & Gas Building
P. O. Drawer O
University, AL 35486
Contacts: Nelson Lloyd, Geochemical Water Research
T. W. Daniel, Energy Resources
J. D. Moore, Water Resources
Scott Mettee, Environmental
Telephone: (205) 349-2852

The Geological Survey of Alabama has been and is involved in several areas of research that deal with the environmental effects of the strip mining of coal in Alabama. See sections on Reports and Documents, and Water Monitoring Programs.

Alabama Department of Industrial Relations
649 Monroe Street
Montgomery, AL 36109
Contact: Director
Telephone: (205) 832-3626

Alabama Department of Industrial Relations
Abandoned Mined Land - Reclamation Division
2160 Greensprings Highway, Suites C & D
Birmingham, AL 35205
Contact: John Griffin
Harold Smith
Telephone: (205) 251-1181

Locations of abandoned underground mine sites.

RESEARCH AND DATA COLLECTION NEEDS

Hydrologic research and data collection for BLM will, by necessity, be concentrated in geographic areas of Federal coal activity. In Alabama, Federal coal activities will be concentrated in the Warrior coal field (fig. 1) where Federal Mineral Ownership (FMO) exceeds 70,000 acres under privately owned surface. Scattered FMO occurs in the Plateau coal field. The Bureau of Land Management (BLM) is also responsible for minerals management in National Forests. National Forests in Alabama underlain by coal reserves with development potential are restricted to the Bankhead National Forest and the Oakmulgee Division of the Talladega National Forest. Federal law prohibits the surface mining of coal in National Forests.

Research and data needs are based on the need for information by BLM for their EIS work and for the preparation of planning documents. The needs vary from time to time and are dependent, in part, on information already available for an area of interest. Some potential high priority needs that have been considered or are being considered by the Bureau of Land Management include:

1. Quantitative hydrological studies of reclaimed surface-mined areas.
2. Limnological reconnaissance of Lake Tuscaloosa.
3. Watershed Modeling.
4. Hydrological changes resulting from underground mining .
5. Long-term impacts from surface and underground coal mining on hydrology
6. Ground-water availability in potential mine areas.
7. Surface-water availability in potential mine areas.
8. Relation of geologic structure and stratigraphy to ground-water movement and pollution transport in the Pottsville Formation.
9. Well inventory and an expanded ground-water monitoring network in all potential mineral lease areas.
10. Annual aerial photographic coverage of all Federal Mineral Ownership.
11. The determination of hydrological changes in areas with surface mining reclamation of various ages.
12. Biomonitoring program to analyze the impact of strip mining and reclamation on aquatic communities in the Warrior coal field.
13. Soil moisture studies.
14. Determination of water quality from abandoned holding ponds and spoil seeps after reclamation.
15. Determination of quantitative hydrological changes resulting from different reclamation practices.
16. Relationship of water quality and quantity to coal seams mined.
17. Geologic and hydrologic study of the Bankhead National Forest.
18. Geologic and hydrologic study of the Oakmulgee Division of the Talladega National Forest.
19. Compilation of Federal, State and local water laws and regulations.

SUMMARY AND CONCLUSIONS

Increased interest in coal hydrology in Alabama revealed the need to improve access to reports and existing project activities. An extensive bibliography of over 200 references pertaining to coal hydrology and selected, closely related subjects is presented. This compilation includes documents and reports from various Federal and State agencies, universities, and industry, in addition to a section on current activities in the Warrior and Plateau coal fields of Alabama. Maps, automated-data bases, and water-monitoring programs are discussed. This report is a reference source of information on coal hydrology in Alabama.