BULLETINS

†B 1. The Volatile Matter of Coal, by H. C. Porter and F. K. Ovitz. 1910. 56 pp., 1 pl., 9 figs. Discusses briefly the composition of the volatile matter of several typical American coals and the amount given off at different temperatures.

†B 2. North Dakota Lignite as a Fuel for Power-Plant Boilers, by D. T. Randall and Henry Kreisinger. 1910. 42 pp., 1 pl., 7 figs. Gives results of steaming tests at Williston, N. Dak., in a boiler plant having furnace of special design. Of interest to mechanical engineers and to users of lignite.

†B 3. The Coke Industry of the United States as Related to the Foundry, by Richard Moldenke. 1910. 82 pp. Calls attention to the waste in coke making; points out how coke can be used to best advantage in the cupola; and suggests improvements in foundry practice.

†B 4. Features of Producer-Gas Power-Plant Development in Europe, by R. H. Fernald. 1911. 27 pp., 4 pls., 7 figs. Briefly summarizes some features of gas-producing practice, with particular reference to the use of low-grade fuels.

†B 5. Washing and Coking Tests of Coal at the Fuel-Testing Plant, Denver, Colo., July 1, 1908, to June 30, 1909, by A. W. Belden, R. G. Delameter, J. W. Groves, and K. M. Way. 1910. 62 pp., 1 fig. Describes methods and results. Most of the coals tested were from coal fields in the Rocky Mountain province.

†B 6. Coals Available for the Manufacture of Illuminating Gas, by A. H. White and Perry Barker, compiled and revised by H. M. Wilson. 1911. 77 pp., 4 pls., 12 figs. Gives tests of coals from Blocton, Ala.; Oak Creek and Sopris, Colo.; Harrisburg, Ill.; Heller, Ky.; Saginaw, Mich.; Van Houton, N. Mex.; Scott Haven, Pa.; La Follette, Tenn.; Page, W. Va.; and Hanna, Wyo.

†B 7. Essential Factors in the Formation of Producer Gas, by J. K. Clement, L. H. Adams, and C. N. Haskins. 1911. 58 pp., 1 pl., 16 figs. Describes laboratory experiments bearing on the rate of formation of carbon monoxide at high temperatures and the effect of temperature on the rate of formation and the composition of water gas. Indicates how the results of the tests apply to the operation of boiler furnaces and gas producers.

†B 8. The Flow of Heat Through Furnace Walls, by W. T. Ray and Henry Kreisinger. 1911. 32 pp., 19 figs. Describes experiments that show that a furnace wall with an air space offers less resistance to heat flow than a solid wall of the same thickness. Discusses the laws of heat transmission. (See also B 18 and TP 114.)

†B 9. Recent Development of the Producer-Gas Power Plant in the United States, by R. H. Fernald. 1910. 82 pp., 2 pls., 3 figs. Discusses the opinions of owners and manufacturers on the efficiency of the plants and gives a list of installations in the United States. Reprint of Geological Survey Bulletin 416.

†B 10. The Use of Permissible Explosives, by J. J. Rutledge and Clarence Hall. 1912. 34 pp., 5 pls., 4 figs. Discusses the manner in which permissible explosives can be used to best advantage in blasting coal. Is intended especially for coal miners and mine officials.

†Out of print.

†B 11. The Purchase of Coal by the Government Under Specifications, with Analyses of Coal Delivered for the Fiscal Year 1908–9, by G. S. Pope. 1910. 80 pp. Describes the Government's plan of purchasing coal under specifications, the methods of sampling and testing, and many analyses of coals. Reprint of Geological Survey Bulletin 428.

†B 12. Apparatus and Methods for the Sampling and Analysis of Furnace Gases, by J. C. W. Frazer and E. J. Hoffman. 1911. 22 pp., 6 figs. Describes methods of taking "continuous" and "instantaneous" samples and the special apparatus designed for such sampling.

†B 13. Résumé of Producer-Gas Investigations, October 1, 1904, to June 30, 1910, by R. H. Fernald and C. D. Smith. 1911. 393 pp. Summarizes the results of producer-gas investigations at the Government fuel-testing plants. Incidentally discusses gas-producer development in this country and in Europe. Is intended especially for mechanical engineers and power-plant officials interested in gas-producer design and in the operation of gas producers on the coal available at different points in the United States.

†B 14. Briquetting Tests of Lignite at Pittsburgh, Pa., 1908–9, with a chapter on Sulfite-Pitch Binder, by C. L. Wright. 1911. 64 pp., 12 pls., 4 figs. Describes the lignites tested and the briquetting plant, gives results of the tests, and presents a statement of the probable cost of briquetting lignite on a commercial scale.

†B 15. Investigations of Explosives Used in Coal Mines, by Clarence Hall, W. O. Snelling, and S. P. Howell, with a chapter on the Natural Gas Used at Pittsburgh, by G. A. Burrell, and an introduction by C. E. Munroe. 1911. 197 pp., 7 pls., 5 figs. Discusses thermochemistry of explosives, apparatus and methods for physical tests of explosives, and results of tests of various explosives.

†B 16. The Uses of Peat for Fuel and Other Purposes, by C. A. Davis. 1911. 214 pp., 1 pl., 1 fig. Superseded by B 253.

†B 17. A Primer on Explosives for Coal Miners, by C. E. Munroe and Clarence Hall. 1911. 69 pp., 10 pls., 12 figs. Discusses combustion and explosion, the composition of explosives, the handling and use of explosives and of squibs, fuses, and detonators, and concludes with notes on the safe shipment and storage of explosives and the requirements of permissible explosives. Reprint of Geological Survey Bulletin 423.

†B 18. The Transmission of Heat Into Steam Boilers, by Henry Kreisinger and W. T. Ray. 1912. 180 pp., 78 figs. Is a technical discussion of the factors affecting the capacity and efficiency of steam boilers. Presents the results of numerous tests and a mathematical treatment of the theory of heat transmission through boiler tubes. (See also B 8 and TP 114.)

†B 19. Physical and Chemical Properties of the Petroleums of the San Joaquin Valley, Calif., by I. C. Allen and W. A. Jacobs, with a chapter on Analyses of Natural Gas from the Southern California Oil Fields, by G. A. Burrell. 1911. 60 pp., 2 pls., 10 figs. Briefly states the method used by the Bureau of Mines in determining the heating value and other

State	City	Library [1]
Pennsylvania	Bethlehem	Lehigh University. (D, 1)
	Harrisburg	Pennsylvania State. (D, 1)
	Philadelphia	Franklin Institute. (2)
		Free Library of Philadelphia. (D, 1)
		University of Pennsylvania. (D, 1)
	Pittsburgh	Carnegie Library of Pittsburgh. (D, 1)
		Mellon Institute. (2)
		University of Pittsburgh. (D, 1)
	Reading	Reading Public. (D, 1)
	Scranton	Scranton Public. (D, 1)
	State College	Pennsylvania State University. (D, 1)
Puerto Rico	Mayaguez	University of Puerto Rico, College of Agriculture and Mechanical Arts Library. (D, 1)
	Rio Piedras	University of Puerto Rico. (D, 1)
Rhode Island	Kingston	University of Rhode Island. (D, 1)
	Providence	Brown University. (D, 1)
South Carolina	Columbia	University of South Carolina. (D, 1)
South Dakota	Brookings	South Dakota State, Lincoln Memorial Library. (D, 1)
	Huron	Huron College. (5)
	Mitchell	Dakota Wesleyan University. (D, 1)
	Rapid City	South Dakota State School of Mines and Technology. (1)
	Vermillion	University of South Dakota. (D, 1)
Tennessee	Chattanooga	Chattanooga Public. (D, 1)
	Knoxville	University of Tennessee. (D, 1)
	Memphis	Cossitt. (D, 1)
	Nashville	Joint University. (D, 1)
		Vanderbilt University. (5)
Texas	Austin	Texas State. (D, 1)
		University of Texas. (D, 1)
	College Station	Agriculture and Mechanical College of Texas. (D, 1)
		Texas Engineers. (2)
	Dallas	Dallas Public. (D, 1)
		Southern Methodist University. (D, 1)
	El Paso	El Paso Public. (D, 1)
		Texas Western College. (2)
	Fort Worth	Fort Worth Public. (D, 1)
	Galveston	Rosenberg. (D, 1)
	Houston	Houston Public. (D, 1)
		Rice Institute, The Fondren Library. (2)
		University of Houston. (2)
	Lubbock	Texas Technological College. (D, 1)
	Midland	Midland County. (2)
	San Antonio	Public (La Villita Annex). (D, 1)
	Waco	Baylor University. (D, 1)
Utah	Provo	Brigham Young University. (D, 1)
	Salt Lake City	Free Public. (2)
		University of Utah. (D, 1)
Vermont	Middlebury	Middlebury College. (D, 1)
Virginia	Blacksburg	Virginia Polytechnic Institute. (D, 1)
	Charlottesville	Department of Conservation and Development Library. (4)
	Emory	Emory and Henry College. (D, 1)
	Richmond	Virginia State. (D, 1)
	University	University of Virginia. (D, 1)
Washington	Olympia	Washington State. (D, 1)
	Pullman	Washington State University. (D, 1)
	Seattle	Seattle Public. (D, 1)
		University of Washington. (D, 1)
		University of Washington, Mines Library. (2)
	Spokane	Spokane Public. (D, 1)
	Tacoma	College of Puget Sound. (2)
		Tacoma Public. (D, 1)
West Virginia	Charleston	State. (D, 1)
	Huntington	Marshall College. (D, 1)
	Morgantown	West Virginia University. (D, 1)
Wisconsin	Madison	University of Wisconsin. (D, 1)
	Milwaukee	Milwaukee Public. (D, 1)
	Racine	Racine Public. (D, 1)
Wyoming	Cheyenne	Wyoming State. (D, 1)
	Laramie	University of Wyoming. (D, 1)

[1] See types of publications received by libraries, immediately preceding this list (p. 4).

properties of the fuel products derived from the petroleum mentioned and gives the results of the examination of a large number of samples. Also describes an electric still for fractionating petroleum and briefly summarizes the methods used in analyzing natural gas.

†B 20. The Explosibility of Coal Dust, by G. S. Rice, with chapters by J. C. W. Frazer, Axel Larsen, Frank Haas, and Carl Scholz. 1911. 204 pp., 14 pls., 28 figs. Gives a résumé of existing knowledge regarding the explosibility of coal dust suspended in air. Is written for the information of officials of coal-mining companies and of persons investigating the properties of coal dust. Treats of the growth of the coal-dust problem in Europe and in this country, the factors that govern the explosibility of coal dust, and the remedies that may be applied in mines to render coal dust harmless. Revision of Geological Survey Bulletin 425.

†B 21. The Significance of Drafts in Steam-Boiler Practice, by W. T. Ray and Henry Kreisinger. 1911. 64 pp., 26 figs. Discusses the factors that govern the flow of air through fuel beds and boilers and the capacity of boilers. Written for the information of power-plant engineers and designers of boilers. Reprint of Geological Survey Bulletin 367.

†B 22. Analyses of Coals in the United States, with Descriptions of Mine and Field Samples Collected between July 1, 1904, and June 30, 1910, by N. W. Lord, with chapters by J. A. Holmes, F. M. Stanton, A. C. Fieldner, and Samuel Sanford. 1913. Part I, Analyses, pp. 1–321; Part II, Descriptions of samples, pp. 323–1200, 1 fig. Describes methods of collecting and analyzing samples of coal which were taken from over 1,500 mines and prospects in different parts of the United States. Heating values of all the coals are given and both proximate and ultimate analyses of a large proportion of samples.

†B 23. Steaming Tests of Coals and Related Investigations, September 1, 1904, to December 31, 1908, by L. P. Breckenridge, Henry Kreisinger, and W. T. Ray. 1912. 380 pp., 2 pls., 94 figs. Gives a comprehensive summary of tests at the Government fuel-testing plants at St. Louis, Mo., and Norfolk, Va. It is especially intended for mechanical engineers, designers of boiler plants, and persons interested in the efficient utilization of coal under boilers. Summarizes the results of 551 steaming tests with a wide variety of coals and several different types of boilers. Among the subjects discussed are the efficiencies of furnaces and boilers and the relation of combustion, composition of the products of combustion, air supply, combustion of coal, the results of the tests, and the principles involved in the combustion of coal in boiler furnaces.

†B 24. Binders for Coal Briquets, by J. E. Mills. 1911. 56 pp., 1 fig. See B 58 for details of tests. Describes investigations to determine the suitability of various substances as binders for coal briquets. Reprint of Geological Survey Bulletin 843.

†B 25. Mining Conditions Under the City of Scranton, Pa., Report and Maps, by William Griffith and E. T. Conner, with a preface by J. A. Holmes and a chapter by N. H. Darton. 1912. 89 pp., 29 pls. Gives results of an investigation undertaken to determine the probable danger from subsidence of the surface through the removal of coal from the various beds underlying the city. Shows by large-scale maps the extent of the workings in each bed. Discusses various methods for supporting the roof and commends the flushing of sand or other material from the surface.

†B 26. Notes on Explosive Mine Gases and Dusts, with Especial Reference to Explosions in the Monongah, Darr, and Naomi Coal Mines, by R. T. Chamberlin. 1911. 67 pp., 1 fig. Describes an investigation of the gases in coal, their quantity and composition. Discusses factors governing the escape of gas in mines and the part played by coal dust in three great mine disasters. Reprint of Geological Survey Bulletin 383.

†B 27. Tests of Coal and Briquets as Fuel for House-Heating Boilers, by D. T. Randall. 1911. 44 pp., 3 pls., 2 figs. Compares bituminous coal, anthracite, and briquets. Gives the results of tests and presents data for determining the relative value of fuels for use in house-heating boilers. Reprint of Geological Survey Bulletin 366.

†B 28. Experimental Work Conducted in the Chemical Laboratory of the United States Fuel-Testing Plant at St. Louis Mo., January 1, 1905, to July 31, 1906, by N. W. Lord. 1911. 51 pp. Discusses factors affecting the accuracy of the analysis of coal by the methods used at the fuel-testing plant in St. Louis. Reprint of Geological Survey Bulletin 323.

†B 29. The Effect of Oxygen in Coal, by David White. 1911. 80 pp., 3 pls. Compares the composition, especially the oxygen content, of a large number of coals in its relation to the calorific value of a given coal. Discusses the cause of the variation in oxygen content and the relation of the original constituents of a coal to coking properties. Is intended for chemists, geologists, and fuel engineers. Reprint of Geological Survey Bulletin 382.

†B 30. Briquetting Tests at the United States Fuel-Testing Plant, Norfolk, Va., 1907–8, by C. L. Wright. 1911. 41 pp., 9 pls. Describes the two types of presses used in the tests and results obtained with 15 different coals. Reprint of Geological Survey Bulletin 385.

†B 31. Incidental Problems in Gas-Producer Tests, by R. H. Fernald, C. D. Smith, J. K. Clement, and H. A. Grine. 1911. 29 pp., 8 figs. Considers the factors affecting the proper length of gas-producer tests and the differences in temperature at different points in the fuel bed. Reprint of Geological Survey Bulletin 393.

†B 32. Commercial Deductions from Comparisons of Gasoline and Alcohol Tests on Internal-Combustion Engines, by R. M. Strong. 1911. 38 pp. Summarizes deductions based on 2,000 comparative tests of gasoline and alcohol. Reprint of Geological Survey Bulletin 392.

†B 33. Comparative Tests of Run-of-Mine and Briquetted Coal on the Torpedo Boat *Biddle*, by W. T. Ray and Henry Kreisinger. 1911. 50 pp., 10 figs. Describes the tests. Calls attention to the importance of large combustion space in burning smoky coals. Reprint of Geological Survey Bulletin 403.

†B 34. Tests of Run-of-Mine and Briquetted Coal in a Locomotive Boiler, by W. T. Ray and Henry Kreisinger. 1911. 33 pp., 9 figs. Describes the tests. Gives suggestions as to possible methods of increasing the capacity of locomotive boilers. Reprint of Geological Survey Bulletin 412.

†B 35. The Utilization of Fuel in Locomotive Practice, by W. F. M. Goss. 1911. 29 pp., 8 figs. Presents the results of tests bearing on the heat lost and utilized from the fuel burned. Gives some general conclusions as to the probable economies to be effected. Reprint of Geological Survey Bulletin 402.

†B 36. Alaskan Coal Problems, by W. L. Fisher. 1911. 32 pp., 1 pl. Summarizes information regarding the areal extent of the Alaska coal fields, the quality of the coal, its suitability for various purposes, and the probable market for it.

†B 37. Comparative Tests of Run-of-Mine and Briquetted Coal on Locomotives, Including Torpedo-Boat Tests, and Some Foreign Specifications for Briquetted Fuel, by W. F. M. Goss. 1911. 58 pp., 4 pls., 35 figs. Discusses the use of briquets in Germany, Belgium, and France, and gives the results of some

†Out of print.

tests of a Pennsylvania bituminous coal. Reprint of Geological Survey Bulletin 363.

†B 38. The Origin of Coal, by David White and Reinhardt Thiessen, with a chapter on the Formation of Peat, by C. A. Davis. 1913. 390 pp., 54 pls. Discusses the geologic relations of the different coals and the effects of physiographic conditions, rate of deposition, and regional metamorphism, the origin and formation of peat, and the constitution of coal as determined by miscroscopic study.

†B 39. The Smoke Problem at Boiler Plants, a Preliminary Report, by D. T. Randall. 1912. 31 pp. Discusses conditions at boiler plants in the United States, the smoke ordinances of various cities, the factors that cause smoke, and the methods of smoke abatement. Revision, by S. B. Flagg, of Geological Survey Bulletin 334.

†B 40. The Smokeless Combustion of Coal in Boiler Furnaces, with a chapter on Central Heating Plants, by D. T. Randall and H. W. Weeks. 1912. 188 pp., 40 figs. Describes results of an investigation of a large number of boiler plants in different cities. Gives details of the furnaces and boilers used at these plants and the methods of firing. Also gives the results of tests made at the Government fuel-testing plants at St. Louis, Mo., and Norfolk, Va., to determine the factors governing the production of smoke. Revision, by Henry Kreisinger, of Geological Survey Bulletin 373.

†B 41. Government Coal Purchases Under Specifications, with Analyses for the Fiscal Year 1909–10, by G. S. Pope, with a chapter on the Fuel-Inspection Laboratory of the Bureau of Mines, by J. D. Davis. 1912. 97 pp., 3 pls. Discusses the value of coal as fuel, the advantages of definite specifications for purchasing coal, and the Government as a coal purchaser. Gives heating value of a large number of coals used at Government power plants and the proximate analyses of most of these coals.

†B 42. The Sampling and Examination of Mine Gases and Natural Gas, by G. A. Burrell and F. M. Seibert. 1913. 116 pp., 2 pls., 23 figs. Revised as B 197.

†B 43. Comparative Fuel Values of Gasoline and Denatured Alcohol in Internal-Combustion Engines, by R. M. Strong and Lauson Stone. 1912. 243 pp., 3 pls., 32 figs. Gives a detailed statement of the results of 2,000 tests made to determine the comparative value of the two fuels for use in internal-combustion engines. Is a technical report, written for mechanical engineers and persons interested in the utilization of liquid fuels.

†B 44. First National Mine Safety Demonstration, Pittsburgh, Pa., October 30 and 31, 1911, by H. M. Wilson and A. H. Fay, with a chapter on the Explosion at the Experimental Mine, by G. S. Rice. 1912. 75 pp., 7 pls., 4 figs.

†B 45. Sand Available for Filling Mine Workings in the Northern Anthracite Basin of Pennsylvania, by N. H. Darton. 1913. 33 pp., 8 pls., 5 figs. Discuss character and extent of deposits of sand available for hydraulic filling of anthracite mine workings. Is of local interest.

†B 46. An Investigation of Explosion-Proof Motors, by H. H. Clark. 1912. 44 pp., 6 pls., 14 figs. Describes tests of several types of protective devices for mine motors and states the effectiveness of these devices in preventing the ignition of mine gases by sparks within the motor casing.

†B 47. Notes on Mineral Wastes, by C. L. Parsons. 1912. 44 pp. Reviews the more important losses in the treatment and utilization of minerals, ores, and metals; discusses new sources of supply and the probable development of new uses.

†B 48. The Selection of Explosives Used in Engineering and Mining Operations, by Clarence Hall and S. P. Howell. 1914. 50 pp., 3 pls., 7 figs. States the characteristics of different classes of explosives and sets forth the results of tests showing the suitability of explosives for different kinds of blasting. The pamphlet is written for the information of all persons interested in the use of explosives for blasting rock.

†B 49. Smoke Abatement and City Smoke Ordinances, by S. B. Flagg. 1912. 55 pp. Discusses status of smoke abatement in 28 American cities and the essential features of a smoke ordinance for a large, medium-size, and small city.

†B 50. A Laboratory Study of the Inflammability of Coal Dust, by J. C. W. Frazer, E. J. Hoffman, and L. A. Scholl, Jr. 1913. 60 pp., 95 figs. Summarizes the results of tests of the inflammability of a large number of samples of coal dust from different mines.

†B 51. The Analysis of Black Powder and Dynamite, by W. O. Snelling and C. G. Storm. 1913. 80 pp., 5 pls., 5 figs. Presents methods of analysis of "ordinary" dynamite, the ammonia, gelatin, low-freezing, and granular dynamites, and the common grades of black gunpowder and black blasting powder.

†B 52. Ignition of Mine Gases by the Filaments of Incandescent Electric Lamps, by H. H. Clark and L. C. Ilsley. 1913. 31 pp., 6 pls., 2 figs. Describes tests showing the liability of the filaments to ignite firedamp.

†B 53. Mining and Treatment of Feldspar and Kaolin in the Southern Appalachian Region, by A. S. Watts. 1913. 170 pp., 16 pls., 12 figs. Describes the feldspar and kaolin obtained from the pegmatite dikes of the region investigated, the tests made, and the mining and washing of kaolin.

†B 54. Foundry-Cupola Gases and Temperatures, by A. W. Belden. 1913. 29 pp., 3 pls., 16 figs. Discusses the sampling of gases during their travel from the tuyères upward, the method of determining the temperature of the fuel bed, the apparatus used, and the results obtained.

†B 55. The Commercial Trend of the Producer-Gas Power Plant, by R. H. Fernald. 1913. 98 pp., 1 pl., 4 figs. Discusses the present status of the producer-gas power plant, with views of manufacturers and of owners and operators of producer-gas power plants. The number and distribution of producer-gas power plants in the United States are shown.

†B 56. First Series of Coal-Dust Explosion Tests in the Experimental Mine, by G. S. Rice, L. M. Jones, J. K. Clement, and W. L. Egy. 1913. 115 pp., 12 pls., 28 figs. Describes the Experimental mine and its equipment and gives the results of a series of explosion tests. (See also B 167 and 268.)

†B 57. Safety and Efficiency in Mine Tunneling, by D. W. Brunton and J. A. Davis. 1914. 271 pp., 6 pls., 45 figs. Discusses selection of power, surface, and underground equipment; methods of drilling, blasting, and mucking; and the causes and prevention of accidents. Gives a review of the history of tunneling and a bibliography of the more important literature.

†B 58. Fuel-Briquetting Investigations, July 1904 to July 1912, by C. L. Wright. 1913. 277 pp., 21 pls., 3 figs. Summarizes the fuel-briquetting investigations conducted by the Government within the period indicated.

†B 59. Investigations of Detonators and Electric Detonators, by Clarence Hall and S. P. Howell. 1913. 73 pp., 7 pls., 5 figs. Describes the results of tests undertaken to determine the efficiency of different grades of detonators and gives a simple test for determining the strength of detonators or electric detonators.

†B 60. Hydraulic Mine Filling, Its Use in the Pennsylvania Anthracite Fields, a Preliminary Report, by Charles Enzian. 1913. 77 pp., 3 pls., 12 figs. Describes

†Out of print.

the method of filling mine workings with culm and other fine refuse, the equipment used, and the cost.

†B 61. Abstracts of Current Decisions on Mines and Mining, October 1912 to March 1913, by J. W. Thompson. 1913. 82 pp. Records decisions of Federal and State courts of last resort on questions relating to the mineral industry. (See B 79, 90, 101, 113, 118, 126, 143, 147, 152, 159, 164, 172, 174, 179, 181, 183.)

†B 62. National Mine Rescue and First-Aid Conference, Pittsburgh, Pa., September 23–26, 1912, by H. M. Wilson. 1913. 74 pp. Gives the addresses made at the conference, the resolutions adopted, and the discussions of various topics relating to rescue and first-aid methods at mines.

†B 63. Sampling Coal Deliveries and Types of Government Specifications for the Purchase of Coal, by G. S. Pope. 1913. 68 pp., 4 pls., 3 figs. Revised as B 116.

†B 64. The Titaniferous Iron Ores in the United States; Their Composition and Economic Value, by J. T. Singewald, Jr. 1913. 145 pp., 16 pls., 3 figs. Gives the results of an investigation to determine the practicability of separating magnetite and ilmenite in titaniferous magnetites by magnetic concentration.

†B 65. Oil and Gas Wells Through Workable Coal Beds; Papers and Discussions, by G. S. Rice, O. P. Hood, and others. 1913. 101 pp., 1 pl., 11 figs. Papers read before a conference held to discuss suitable methods of safeguarding coal miners from the dangers attending the drilling of oil and gas wells through coal beds.

†B 66. Tests of Permissible Explosives, by Clarence Hall and S. P. Howell. 1913. 313 pp., 1 pl., 6 figs. Presents the results of tests made at the Pittsburgh Experiment Station to determine the permissibility of explosives and describes principal features of apparatus used.

†B 67. Electric Furnaces for Making Iron and Steel, by D. A. Lyon and R. M. Keeney. 1914. 142 pp., 36 figs. Summarizes development of furnaces and methods to 1914.

†B 68. Electric Switches for Use in Gaseous Mines, by H. H. Clark and R. W. Crocker. 1913. 38 pp., 6 pls., 1 fig. Describes two types of switches and gives results of tests of each type.

†B 69. Coal-Mine Accidents in the United States and Foreign Countries, compiled by F. W. Horton. 1913. 102 pp., 3 pls., 40 figs. Shows number of men employed, tonnage of coal produced, and accident and fatality rates. Accidents and fatalities classified by causes.

†B 70. A Preliminary Report on Uranium, Radium, and Vanadium, by R. B. Moore and K. L. Kithil. 1913. 114 pp., 4 pls., 2 figs. Describes the occurrence of carnotite and associated uranium-bearing minerals in Colorado and Utah, points out the importance of the minerals as a source of radium, and describes methods of mining and treatment.

†B 71. Fuller's Earth, by C. L. Parsons. 1913. 38 pp. Briefly discusses characteristics of fuller's earth, excellence of American earths for refining edible oils, and methods of mining and purifying the raw earth.

†B 72. Occurrence of Explosive Gases in Coal Mines, by N. H. Darton. 1915. 248 pp., 7 pls., 33 figs. Considers particularly mines in the northern anthracite field of Pennsylvania and the southern part of the Illinois coal field.

†B 73. Brass-Furnace Practice in the United States, by H. W. Gillett. 1914. 298 pp., 2 pls., 23 figs. Discusses features of different types of furnaces, losses in melting, sanitary conditions at foundries, and the health of foundrymen.

†B 74. Gasoline Mine Locomotives in Relation to Safety and Health, by O. P. Hood and R. H. Kudlich, with a chapter on Methods of Analyzing Exhaust Gases, by G. A. Burrell. 1915. 83 pp., 3 pls., 27 figs. Describes results of tests of a gasoline locomotive.

†B 75. Rules and Regulations for Metal Mines, by W. R. Ingalls and others. 1915. 296 pp., 1 fig. Gives rules proposed by a committee of mining engineers. (See also TP 602.)

†B 76. United States Coal Available for Export Trade, by V. H. Manning. 1914. 15 pp., 1 pl. Also printed in Spanish and in Portuguese. Briefly describes general character and commercial quality of some of the coal most available for export.

†B 77. The Electric Furnace in Metallurgical Work, by D. A. Lyon, R. M. Keeney, and J. F. Cullen. 1914. 216 pp., 56 figs. Furnaces and methods discussed are now largely out of date.

†B 78. Approved Explosion-Proof Coal-Cutting Equipment, by L. C. Ilsley and E. J. Gleim. 1920. 53 pp., 18 pls., 3 figs. Describes essential features of explosion-proof equipment and describes equipment approved by Bureau of Mines. (See also B 382.)

†B 79. Abstracts of Current Decisions on Mines and Mining, Reported from March to December 1913, by J. W. Thompson. 1914. 140 pp. (See also B 61, 90, 101, 113, 118, 126, 143, 147, 152, 159, 164, 172, 174, 179, 181, and 183.)

†B 80. A Primer on Explosives for Metal Miners and Quarrymen, by C. E. Munroe and Clarence Hall. 1915. 125 pp., 15 pls., 17 figs. Treats of the use of fuses, detonators, and electric detonators; drilling and blasting methods; and construction, care, and use of magazines and thaw houses.

†B 81. The Smelting of Copper Ores in the Electric Furnace, by D. A. Lyon and R. M. Keeney. 1915. 80 pp., 6 figs. Furnaces and methods discussed are now largely out of date.

†B 82. International Conference of Mine Experiment Stations, Pittsburgh, Pa., September 14–21, 1912, compiled by G. S. Rice. 1914. 99 pp., 4 figs. Contains papers on explosion tests, spontaneous combustion of coal, escape of gas from coal, weathering and oxidation of coal, explosibility of mine gases, sampling and analysis of coal dust and mine gases, mine rescue apparatus, miners' safety lamps, and requirements.

†B 83. The Humidity of Mine Air with Especial Reference to Coal Mines in Illinois, by R. Y. Williams. 1914. 69 pp., 2 pls., 7 figs. Describes apparatus and methods and summarizes results of investigations.

†B 84. Metallurgical Smoke, by C. H. Fulton. 1915. 94 pp., 6 pls., 15 figs. Discusses constituents and their removal.

†B 85. Analyses of Mine and Car Samples of Coal Collected in the Fiscal Years 1911 to 1913, by A. C. Fieldner, H. I. Smith, A. H. Fay, and Samuel Sanford. 1914. 444 pp., 2 figs. Describes methods of collecting and analyzing samples of coal. Gives analyses of coal samples collected and notes on the mines.

†B 86. Some Mining and Engineering Problems of the Panama Canal in their Relation to Geology and Topography, by D. F. McDonald. 1915. 88 pp., 29 pls., 9 figs.

†B 87. Houses for Mining Towns, by J. H. White. 1914. 64 pp., 8 pls., 9 figs. Treats of plans for and arrangement of mining towns and the construction of houses and briefly discusses water supply and sewage disposal.

†B 88. The Condensation of Gasoline from Natural Gas, by G. A. Burrell, F. M. Seibert, and G. G. Oberfell. 1915. 106 pp., 6 pls., 18 figs. Describes the growth of the industry. Discusses methods of condensation, transportation, and blending with reference to lessening waste of gas.

†Out of print.

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†B 89. Economic Methods of Utilizing Western Lignite, by E. J. Babcock. 1915. 73 pp., 5 pls., 5 figs. See B 255 for summary of work described.

†B 90. Abstracts of Current Decisions on Mines and Mining, Reported from December 1913 to September 1914, by J. W. Thompson. 1915. 176 pp. (See also B 61, 79, 101, 113, 118, 126, 143, 147, 152, 159, 164, 172, 174, 179, 181, and 183.)

†B 91. Instruments for Recording Carbon Dioxide in Flue Gases, by J. F. Barkley and S. B. Flagg. 1916. 60 pp., 1 pl., 25 figs. Describes results of tests of various instruments to determine accuracy, durability, and attention required.

†B 92. Feldspar of the New England and Northern Appalachian States, by A. S. Watts. 1916. 181 pp., 8 pls., 22 figs. Gives results of examination of deposits and tests of samples.

†B 93. Miners' Nystagmus, by F. L. Hoffman. 1916. 67 pp. Reviews the results of investigations of miners' nystagmus in Europe and draws tentative conclusions as to the possible frequency of the disease in the United States.

†B 94. United States Mining Statutes Annotated, by J. W. Thompson. 1915. 1,772 pp. Is intended for persons engaged in mining enterprises that come within the scope of the Federal mining laws, and as a guide in the determination of mining rights and duties. Shows the status of every Federal mining law, those laws relating to metal mining, and those relating to coal, oil, and phosphate, and to mining on public, Indian, and railroad lands. Includes references to Alaska and the Philippine Islands.

B 95. Glossary of Mining Terms, by A. H. Fay. 1920. 754 pp. Is a comprehensive glossary, defining 20,000 words and terms used in geology, mining, chemistry, and metallurgy, including localisms, provincialisms, and words now obsolete. $2.25.

†B 96. The Analysis of Permissible Explosives, by C. G. Storm. 1916. 88 pp., 3 pls., 7 figs. Describes methods used by the Bureau of Mines in the analysis of samples of explosives received for tests to determine their permissibility. Is intended especially for manufacturers of explosives but should be of interest to chemists engaged in similar analytical work.

†B 97. Sampling and Analyzing Flue Gases, by Henry Kreisinger and F. K. Ovitz. 1915. 70 pp., 1 pl., 36 figs. Describes simple methods that can be used by men in charge of boiler plants.

†B 98. Report of the Selby Smelter Commission, by J. A. Holmes, E. C. Franklin, and R. A. Gould, with reports by associates on the commissioners' staff. 1915. 528 pp., 41 pls., 14 figs. Describes in detail the methods used in determining the contamination of the air and the damage to trees, crops, and livestock by the smoke and fume from the Selby smelter, in California, and gives the conclusions of the commission on the methods used by the smelter company to prevent injury. Is of especial interest to metallurgical companies, municipal or State boards of health, and persons investigating damage by smelter smoke.

†B 99. Mine-Ventilation Stoppings, with Especial Reference to Coal Mines in Illinois, by R. Y. Williams. 1915. 30 pp., 4 pls., 4 figs. Discusses first cost of different types of stoppings and cost of maintenance.

†B 100. Manufacture and Use of Alloy Steels, by H. D. Hibbard. 1915. 77 pp. A general statement on the composition and heat treatment of various steels and their use for special purposes.

†B 101. Abstracts of Current Decisions on Mines and Mining, Reported from October 1914 to April 1915, by J. W. Thompson. 1915. 138 pp. (See also B 61, 79, 90, 113, 118, 126, 143, 147, 152, 159, 164, 172, 174, 179, 181, and 183.)

†B 102. The Inflammability of Illinois Coal Dusts, by J. K. Clement and L. A. Scholl, Jr. 1916. 74 pp., 5 pls., 22 figs. Presents the results of a detailed study of coal dusts collected in the bituminous-coal mines of the State.

†B 103. Mining and Concentration of Carnotite Ores, by K. L. Kithil and J. A. Davis. 1917. 89 pp., 14 pls., 5 figs. Describes methods used by Bureau of Mines.

†B 104. Extraction and Recovery of Radium, Uranium, and Vanadium from Carnotite, by C. L. Parsons, R. B. Moore, S. C. Lind, and O. C. Schaefer. 1916. 124 pp., 14 pls., 9 figs. Describes methods used at Denver (Colo.) plant of Bureau of Mines in the treatment of carnotite.

†B 105. Black Damp in Mines, by G. A. Burrell, I. W. Robertson, and G. G. Oberfell. 1916. 88 pp. Presents results of analyses of mine air and discusses the physiological effects of the constituents of black damp.

†B 106. The Technology of Marble Quarrying, by Oliver Bowles. 1916. 174 pp., 12 pls., 33 figs. Summarizes efficient and economical methods of quarrying and preparing marble; describes special and improved machinery and equipment; and points out the need of better systems of cost keeping.

†B 107. Prospecting and Mining of Copper Ore at Santa Rita, N. Mex., by D. F. McDonald and Charles Enzian. 1916. 122 pp., 10 pls., 20 figs. Presents a detailed study of mining operations and costs. Also discusses timekeeping, accounting, and warehouse methods.

†B 108. Melting Aluminum Chips, by H. W. Gillett and G. M. James. 1916. 88 pp. Discusses the loss of aluminum and its alloys in melting scrap and the various preventive methods tested.

†B 109. Operating Details of Gas Producers, by R. H. Fernald. 1916. 74 pp. Discusses present status of producer-gas plants and their uses. Also gives character of fuel used and data on fuel consumption.

†B 110. Concentration Experiments on the Siliceous Red Hematites of the Birmingham District, Alabama, by J. T. Singewald, Jr. 1917. 91 pp., 1 pl., 47 figs. Points out difficulty of concentrating ores by wet methods.

†B 111. Molybdenum; Its Ores and Their Concentration, with a Discussion of Markets, Prices, and Uses, by F. W. Horton. 1916. 182 pp., 18 pls., 2 figs. Describes molybdenum deposits and molybdenum industry in the United States.

†B 112. Mining and Preparing Domestic Graphite for Crucible Use, by G. D. Dub and F. G. Moses. 1920. 80 pp., 5 pls., 20 figs. Suggests a standard method for sampling finished graphite and describes a rapid, convenient method of analysis used by the Bureau.

†B 113. Abstracts of Current Decisions on Mines and Mining, Reported from May to September 1915, by J. W. Thompson. 1916. 124 pp. (See also B 61, 79, 90, 101, 118, 126, 143, 147, 152, 159, 164, 172, 174, 179, 181, and 183.)

†B 114. Manufacture of Gasoline and Benzine-Toluene from Petroleum and Other Hydrocarbons, by W. F. Rittman, C. B. Dutton, and E. W. Dean, with a bibliography compiled by M. S. Howard. 1916. 268 pp., 9 pls., 45 figs. Reviews the literature on the cracking of petroleum and presents in much detail the results of experiments made in the development of improved processes for manufacturing gasoline and benzine-toluene. Gives some of the results achieved in working out the benzene-toluene process on a commercial scale.

†B 115. Coal-Mine Fatalities in the United States, 1870–1914, with Statistics of Coal Production, Labor, and Mining Methods, by States and Calendar Years, compiled by A. H. Fay. 1916. 370 pp., 3 pls., 13 figs. Gives all the fatal accidents described in reports of State inspectors, by States, causes, and calendar years, from the beginning of inspection service to date.

†Out of print.

†B 116. Methods of Sampling Delivered Coal, and Specifications for the Purchase of Coal for the Government, by G. S. Pope. 1916. 64 pp., 5 pls., 2 figs. A revision of B 63. Describes more fully the methods of sampling. (See also TP 133 and 586.)

†B 117. Structure in Paleozoic Bituminous Coals, by Reinhardt Theissen. 1920. 296 pp., 160 pls. Discusses results of microscopic examination, by transmitted and by reflected light, of sections of several typical coals. Presents much evidence on origin of coal from vegetable debris.

†B 118. Abstracts of Current Decisions on Mines and Mining, Reported from October to December 1915, by J. W. Thompson. 1916. 74 pp. (See also B 113.)

†B 119. Analyses of Coals Purchased by the Government During the Fiscal Years 1908–15, by G. S. Pope. 1916. 118 pp. Gives analyses of samples representing deliveries of coal purchased for the Government under specifications.

†B 120. Extraction of Gasoline from Natural Gas by Absorption Methods, by G. A. Burrell, P. M. Biddison, and G. G. Oberfell. 1917. 71 pp., 2 pls., 15 figs. Describes experiments and gives cost of an absorption plant.

†B 121. The History and Development of Gold Dredging in Montana, by Hennen Jennings, with a chapter on Placer-Mining Methods and Operating Costs, by Charles Janin. 1916. 63 pp., 29 pls., 1 fig. Presents cost figures and other data of interest.

†B 122. The Principles and Practice of Sampling Metallurgical Materials, with Special Reference to the Sampling of Copper Bullion, by Edward Keller. 1910. 102 pp., 13 pls., 31 figs. Discusses theory of sampling and its application. Describes procedure and equipment in detail.

†B 123. Analyses of Mine and Car Samples of Coal Collected in the Fiscal Years 1913 to 1916, by A. C. Fieldner, H. I. Smith, J. W. Paul, and Samuel Sanford. 1918. 478 pp., 2 figs. Gives analyses and describes samples.

†B 124. Sandstone Quarrying in the United States, by Oliver Bowles. 1917. 143 pp., 6 pls., 19 figs. Discusses practice and equipment and describes methods and machinery at different quarries.

†B 125. The Analytical Distillation of Petroleum, by W. E. Rittman and E. W. Dean, 1916. 79 pp. 1 pl., 16 figs. Presents results of experiments in distillation methods, the efficiencies of types of fractionation apparatus, and the effect of cracking as a factor in the analytical distillation of petroleum in still heads.

†B 126. Abstracts of Current Decisions on Mines and Mining, Reported from January to April 1916, by J. W. Thompson. 1916. 90 pp. (See also B 113.)

†B 127. Gold Dredging in the United States, by Charles Janin. 1918. 226 pp., 63 pls., 23 figs. Describes methods of recovering gold from sands and gravels.

†B 128. Refining and Utilization of Georgia Kaolins, by I. E. Sproat. 1916. 59 pp., 5 pls., 11 figs. Discusses practicability of applying technical control of clay disperse systems to kaolin refining and the utilization of the prepared clay in the manufacture of vitreous china and wall tile.

†B 129. The Fusibility of Coal Ash and the Determination of the Softening Temperature, by A. C. Fieldner, A. E. Hall, and A. L. Feild. 1918. 146 pp., 4 pls., 38 figs. Gives laboratory methods of determining the fusibility of coal ash and the bearing of the results on clinker formation in fuel beds.

†B 130. Blast-Furnace Breakouts, Explosions, and Slips, and Methods of Prevention, by F. H. Willcox. 1917. 280 pp., 2 pls., 37 figs. Includes a comprehensive and detailed review of blast-furnace construction and practice in their relation to the accidents discussed.

†Out of print.

†B 131. Approved Electric Lamps for Miners, by H. H. Clark and L. C. Ilsley. 1917. 59 pp., 17 pls., 7 figs. Describes tests and lamps.

†B 132. Siliceous Dust in Relation to Pulmonary Disease Among Miners in the Joplin District, Missouri, by Edwin Higgins, A. J. Lanza, F. B. Lahey, and G. S. Rice. 1917. 166 pp., 16 pls., 6 figs. Discusses need of sanitation in mines in order to prevent disease.

†B 133. Wet Thiogen Process for Recovering Sulfur from Sulfur Dioxide in Smelter Gases; a Critical Study, by A. E. Wells. 1917. 66 pp., 2 pls., 3 figs. Gives results of an exhaustive series of tests and indicates possibilities of the process.

†B 134. The Use of Mud-Laden Fluid in Oil and Gas Wells, by J. O. Lewis and W. F. McMurray. 1916. 86 pp., 3 pls., 18 figs. Discusses wastes from faulty methods and the advantages of using mud-laden fluid.

†B 135. Combustion of Coal and Design of Furnaces, by Henry Kreisinger, C. E. Augustine, and F. K. Ovitz. 1917. 144 pp., 1 pl., 45 figs. Discusses the burning of coal on the grate and of volatile matter in the combustion space above the fuel bed.

†B 136. The Deterioration of Stored Coal, by H. C. Porter and F. K. Ovitz. 1917. 38 pp., 7 pls. Covers the results of storage for 5 years, under widely different conditions, of samples of coal from Pennsylvania, West Virginia, and Wyoming; shows small loss of heating value of bituminous coal during storage.

†B 137. The Use of Permissible Explosives in the Coal Mines of Illinois, by J. R. Fleming and J. W. Koster. 1917. 106 pp., 8 pls., 17 figs. Treats the placing and firing of shots and the advantages of permissible explosives.

†B 138. Coking of Illinois Coal, by F. K. Ovitz. 1917. 71 pp., 11 pls., 1 fig. Discusses experiments with coal from different mines and beds; indicates possibility of developing the use of coke from Illinois coal.

†B 139. Control of Hookworm Infection at the Deep Gold Mines of the Mother Lode, California, by J. G. Cumming and J. H. White. 1917. 52 pp., 1 pl., 5 figs. Points out prevalence of hookworm infection and the measures being taken to abate the disease.

†B 140. Occupational Hazards and Accident Prevention at Blast-Furnace Plants, Based on Records of Accidents at Blast Furnaces in Pennsylvania, 1915, by F. H. Willcox. 1917. 155 pp., 16 pls.

†B 141. Yearbook of the Bureau of Mines, 1916, by V. H. Manning. 1917. 174 pp., 17 pls., 8 figs. Describes noteworthy results of the year's work and the apparatus and equipment used.

†B 142. The Mining Industry in the Territory of Alaska During the Calendar Year 1915, by S. S. Smith. 1917. 65 pp., 1 pl. Gives mineral production of mines and districts, with legal regulations.

†B 143. Abstracts of Current Decisions on Mines and Mining, Reported from May to August 1916, by J. W. Thompson. 1917. 72 pp. (See also B 61, 79, 90, 101, 113, 118, 126, 147, 152, 159, 164, 172, 174, 179, 181, and 183.)

†B 144. Report of a Joint Committee Appointed from the Bureau of Mines and the United States Geological Survey by the Secretary of the Interior to Study the Gold Situation, October 30, 1918. 84 pp., 1 pl., 3 figs. Presents statistical data on gold production; discusses its relations to finance and credit, the causes of declining in output, and mining costs; and suggests aiding the industry.

†B 145. Measuring the Temperature of Gases in Boiler Settings, by Henry Kreisinger and J. F. Barkley. 1918. 72 pp., 31 figs. Is intended for boiler-room operators, testing engineers, and others. Presents results of temperature measurements in common types of boilers and discusses errors in usual methods of measurements.

†B 146. The Technology of Salt Making in the United States, by W. C. Phalen. 1917. 149 pp., 24 pls., 10 figs. Reviews the salt industry, with description of methods and equipment.

†B 147. Abstracts of Current Decisions on Mines and Mining, Reported from September to December 1916, by J. W. Thompson. 1917. 84 pp. (See also B 143.)

†B 148. Methods for Increasing the Recovery from Oil Sands, by J. O. Lewis. 1917. 128 pp., 4 pls., 32 figs. Describes particularly the application of compressed air.

†B 149. Bibliography of Petroleum and Allied Substances, 1915, by E. H. Burroughs. 1917. 147 pp.

†B 150. Electrodeposition of Gold and Silver from Cyanide Solutions, by S. B. Christy. 1919. 171 pp., 8 pls., 40 figs. Reviews experiments to determine the factors influencing electrodeposition of the precious metals from cyanide solutions and the process for obtaining maximum efficiency.

†B 151. Recovery of Gasoline from Natural Gas by Compression and Refrigeration, by W. P. Dykema. 1918. 123 pp., 15 pls., 15 figs. Treats the compression and refrigeration process for the recovery of gasoline from natural gas from the viewpoint of the practical engineer and business man.

†B 152. Abstracts of Current Decisions on Mines and Mining, Reported from January to April 1917, by J. W. Thompson. 1917. 79 pp. (See also B 143.)

†B 153. The Mining Industry in the Territory of Alaska During the Calendar Year 1916, by S. S. Smith. 1917. 89 pp., 1 pl. Presents a report on mines and on mineral production, with statistical data.

†B 154. Mining and Milling of Lead and Zinc Ores in the Missouri-Kansas-Oklahoma Zinc District, by C. A. Wright and H. A. Buehler. 1918. 134 pp., 17 pls., 13 figs. Describes the methods used in the district and suggests certain improvements whereby a greater saving may be effected.

†B 155. Oil-Storage Tanks and Reservoirs, with a Brief Discussion of Losses of Oil in Storage and Methods of Prevention, by C. P. Bowie. 1918. 76 pp., 21 pls.

†B 156. The Diesel Engine: Its Fuels and Its Uses, by Herbert Haas. 1918. 132 pp., 16 pls., 57 figs. Describes engine as an important device for insuring more efficient utilization of petroleum and coal-tar products, for the reason that it consumes heavy liquid fuels such as cannot be utilized in other types.

†B 157. Innovations in the Metallurgy of Lead, by D. A. Lyon and O. C. Ralston. 1918. 176 pp., 13 figs. Gives data largely the results of experiments conducted by the Bureau of Mines in cooperation with the department of metallurgical research of the University of Utah. Experiments were with low-grade ores, chiefly lead carbonate.

†B 158. Cost Accounting for Oil Producers, by C. G. Smith. 1917. 123 pp. Presents descriptions and discussions of balance sheets, profit and loss statements, and bookkeeping methods peculiarly adapted to the oil business.

†B 159. Abstracts of Current Decisions on Mines and Mining, Reported from May to August 1917, by J. F. Thompson. 1917. 111 pp. (See also B 143.)

†B 160. Rock Quarrying for Cement Manufacturers, by Oliver Bowles. 1918. 160 pp., 6 pls. 30 figs. Describes chief types of cement, growth of industry, and character of raw materials used. Explains quarrying methods and equipment, with special attention to drilling and blasting, etc.

†B 161. California Mining Statutes, Annotated, by J. W. Thompson. 1918. 312 pp.

†B 162. Removal of the Lighter Hydrocarbons from Petroleum by Continuous Distillation, by J. M. Wadsworth. 1919. 162 pp., 50 pls., 45 figs. Describes the methods of constructing and operating representative types of plants in the United States used for removing the light hydrocarbons from petroleum by continuous distillation. Such plants are known commonly in the trade as topping or skimming plants.

†B 163. Method of Shutting Off Water in Oil and Gas Wells, by F. B. Tough. 1918. 122 pp., 20 pls., 7 figs. Describes the importance of protecting oil or gas sands from the encroachments of water and summarizes existing knowledge of methods and devices.

†B 164. Abstracts of Current Decisions on Mines and Mining, Reported from September to December 1917, by J. W. Thompson. 1918. 147 pp. (See also B 143.)

†B 165. Bibliography of Petroleum and Allied Substances, 1916, by E. H. Burroughs. 1919. 159 pp.

†B 166. A Preliminary Report on the Mining Districts of Idaho, by Thomas Varley, C. A. Wright, E. K. Soper, and D. C. Livingston, in cooperation with the University of Idaho. 1919. 113 pp., 3 pls., 3 figs. Gives a preliminary account of the principal mining districts, past and present, operations, the character of the ores, and the mining and milling methods. Contains a description of the Horseshoe district coal field.

†B 167. Coal-Dust Explosion Tests in the Experimental Mine, 1913 to 1918, inclusive, by G. S. Rice, L. M. Jones, W. L. Egy, and H. P. Greenwald. 1922. 639 pp., 31 pls., 82 figs. Describes the Experimental mine and its equipment and gives results of second series of explosion tests. (See also B 56 and 268.)

†B 168. Recovery of Zinc from Low-Grade and Complex Ores, by D. A. Lyon and O. C. Ralston. 1919. 145 pp., 23 figs. Describes tests of leaching and volatilization methods for the recovery of zinc from low-grade and complex ores.

†B 169. Illinois Mining Statutes, Annotated, by J. W. Thompson. 1918. 594 pp.

†B 170. Extinguishing and Preventing Oil and Gas Fires, by C. P. Bowie. 1918. 56 pp., 20 pls., 4 figs. Describes fire-fighting equipment and methods and suggests precautions necessary to prevent fires at drilling and producing wells.

†B 171. Melting Brass in a Rocking Electric Furnace, by H. W. Gillett and A. E. Rhoads. 1918. 131 pp., 4 pls., 1 fig. Describes experiments and tests in the development of a rocking furnace. Information regarding the furnace given in B 202.

†B 172. Abstracts of Current Decisions on Mines and Mining, Reported from January to April 1918, by J. W. Thompson. 1919. 160 pp. (See also B 61, 79, 90, 101, 113, 118, 126, 143, 147, 152, 159, 164, 174, 179, 181, and 183.)

†B 173. Manganese: Uses, Preparation, Mining Costs, and the Manufacture of Ferro-Alloys, by C. M. Weld and others. 1920. 209 pp., 13 figs.

†B 174. Abstracts of Current Decisions on Mines and Mining, Reported from May to September 1918, by J. W. Thompson. 1919. 138 pp. (See also B 172.)

†B 175. Experiment Stations of the Bureau of Mines, by V. H. Manning. 1919. 106 pp., 29 pls., 2 figs. Describes the equipment of the different stations and the work that they are doing.

†B 176. Recent Developments in the Absorption Process for Recovering Gasoline from Natural Gas, by W. P. Dykema. 1919. 90 pp., 20 pls., 30 figs. Describes recent progress in the use of the absorption process and points out its advantages.

†B 177. The Decline and Ultimate Production of Oil Wells, with Notes on the Valuation of Oil Properties, by C. H. Beal. 1919. 215 pp., 4 pls., 80 figs. Gives methods for estimating the future production of wells and their application to oil-land valuation; presents detailed information on the production of various oil fields.

†Out of print.

†B 178. War Work of the Bureau of Mines, by V. H. Manning. 1919. 107 pp. Published in separates, as follows:

†B 178–A. War Gas Investigations. 39 pp. Summarizes work done on gas masks and war gases.

†B 178–B. War Minerals, Nitrogen Fixation, and Sodium Cyanide. Pp. 41–61. Discusses the work done toward stimulating the production of necessary minerals and ores, the results of the investigation of manufacturing nitric acid from ammonia, and the construction of the plant for making sodium cyanide by the Buchner process.

†B 178–C. Petroleum Investigations and Production of Helium, Pp. 63–88. Tells of many investigations having to do with the production of oil and natural gas, the conservation of supplies, the shipment of gasoline and other petroleum products to the war zone, and the devising of special fuels for aircraft engines. Also discusses the importance of helium as a lifting gas for balloons and airships and the plants built for producing it on a commercial scale.

†B 178–D. Explosives and Miscellaneous Investigations. Pp. 89–107. Describes work on explosives, including the establishment of the licensing system for regulating the manufacture, sale, and use of explosives during the war. Discusses other wartime activities of the Bureau of Mines.

†B 179. Abstracts of Current Decisions on Mines and Mining, Reported from September to December 1918, by J. W. Thompson. 1919. 166 pp. (See also B 172.)

†B 180. Bibliography of Petroleum and Allied Substances, 1917, by E. H. Burroughs. 1920. 170 pp.

†B 181. Abstracts of Current Decisions on Mines and Mining, Reported from January to May 1919, by J. W. Thompson. 1919. 175 pp. (See also B 172.)

†B 182. Casing Troubles and Fishing Methods in Oil Wells, by Thomas Curtin. 1920. 48 pp., 3 pls., 15 figs. Describes equipment and methods.

†B 183. Abstracts of Current Decisions on Mines and Mining, Reported from May to August 1919, by J. W. Thompson. 1920. 167 pp. (See also B 172.)

†B 184. The Manufacture of Sulfuric Acid in the United States, by A. E. Wells and D. E. Fogg. 1920. 216 pp., 36 figs. Gives some of the main facts in regard to the industry in this country; discusses supplies of sulfur-bearing raw materials, technical features of the manufacture of acid, and the uses of the acid.

†B 185. Pennsylvania Mining Statutes, Annotated, by J. W. Thompson. 1920. 1,221 pp.

†B 186. Investigations of Zirconium, by J. W. Marden and M. N. Rich. 1921. 152 pp., 2 pls., 3 figs. Gives a historical review of the literature on zirconium and its compounds and a complete bibliography. Discusses results of experiments and describes furnace used.

†B 187. Treatment of the Tungsten Ores of Boulder County, Colo., by J. P. Bonardi and J. C. Williams. 1921. 79 pp., 18 pls., 10 figs. Deals with the development of milling practice in the district and the methods in use.

†B 188. Lessons from the Granite Mountain Shaft Fire, Butte, by D. Harrington. 1922. 50 pp., 5 pls., 2 figs. Gives an account of the investigation of conditions in the mine before and after the fire and of rescue and recovery work, and presents conclusions and suggestions.

†B 189. Bibliography of Petroleum and Allied Substances, 1918, by E. H. Burroughs. 1921. 180 pp.

†B 190. Coal-Mining Problems in the State of Washington, by G. W. Evans. 1924. 19 pp., 7 pls., 34 figs. Describes methods employed at some of the mines and presents figures regarding the cost of production.

†B 191. Quality of Gasoline Marketed in the United States, by H. H. Hill and E. W. Dean. 1921. 275 pp., 22 figs. Gives analytical figures and fairly complete data on the production, consumption, and quality of gasoline. (See TP 328.)

†B 192. Carbon Black: Its Manufacture, Properties, and Uses, by R. O. Neal and G. St. J. Perrott. 1922. 95 pp., 14 pls., 17 figs. Presents the results of a study of the economic factors governing the carbon-black industry, methods of manufacture now in use, and possibility of producing it by other methods and describes properties and uses.

†B 193. Analyses of Mine and Car Samples of Coal Collected in the Fiscal Years 1916 to 1919, by A. C. Fieldner, W. A. Selvig, and J. W. Paul. 1922. 391 pp., 2 figs. Gives analyses and describes samples.

†B 194. Some Principles Governing the Production of Oil Wells, by C. H. Beal and J. O. Lewis. 1921. 58 pp., 2 pls., 8 figs. Discusses conditions affecting amount of oil in the oil sand, the factors that control the rate of production of oil wells, and effect of production of one well on that of another.

†B 195. Underground Conditions in Oil Fields, by A. W. Ambrose. 1921. 238 pp., 23 pls., 43 figs. Points out the general method of procedure in studying underground conditions in producing oil fields to correct and prevent unnecessary losses.

†B 196. Coal-Mine Fatalities in the United States, 1919, and Coal-Mine Statistics Supplementing Those Published in Bulletin 115, with List of Permissible Explosives, Lamps, and Motor Tests Prior to January 31, 1920, by A. H. Fay. 1920. 86 pp., 1 fig. Gives all the fatal accidents described in reports of State inspectors, by States.

†B 197. Sampling and Examination of Mine Gases and Natural Gas (Revision of Bulletin 42), by G. A. Burrell and F. M. Seibert, revised by G. W. Jones. 1926. 108 pp., 18 pls., 27 figs. Describes apparatus and methods used by the Bureau of Mines. (See also IC 7017.)

†B 198. Regulation of Explosives in the United States, with Especial Reference to the Administration of the Explosives Act of October 6, 1917, by C. E. Munroe. 1921. 45 pp.

†B 199. Experimental Production of Alloy Steels, by H. W. Gillett and E. L. Mack. 1922. 81 pp., 5 pls. Gives results of tests of the various steels and discusses the recovery and the segregation of the different alloying elements.

†B 200. Evaporation Losses of Petroleum in the Mid-Continent Field, by J. H. Wiggins. 1922. 115 pp., 7 pls., 61 figs. Discusses the problem, the methods of attack, and volumetric losses during handling and storage, and presents scientific data on the evaporation of petroleum.

†B 201. Prospecting and Testing for Oil and Gas, by R. E. Collom. 1922. 170 pp., 6 pls., 12 figs. Discusses briefly some of the features of oil and gas accumulation, describes certain oil-field rocks and minerals and kinds of tools that should be used, and discusses the accurate testing of strata for oil or gas.

†B 202. Electric Brass-Furnace Practice, by H. W. Gillett and E. L. Mack. 1922. 334 pp., 25 pls., 35 figs. Records the progress made in melting brass electrically. Is intended to aid plants by pointing out the types of furnaces available; discusses their performance and possibilities.

†B 203. Central District Bituminous Coals as Water-Gas Generator Fuel, by W. W. Odell and W. A. Dunkley. 1924. 92 pp., 11 figs. Outlines principles involved in water-gas manufacture as they apply to the use of bituminous generator fuel and discusses the results obtained in the Streator tests and the application in other plants of the operating methods developed.

†B 204. Underground Ventilation at Butte, by D. Harrington. 1923. 131 pp., 3 pls., 42 figs. Presents data

†Out of print.

collected during 2½ years of study and observation by the Bureau of Mines, in cooperation with the United States Public Health Service, at Butte, Mont.

†B 205. Flotation Tests of Idaho Ores, by C. A. Wright, J. G. Parmelee, and J. T. Norton. 1921. 70 pp., 8 pls., 1 fig. Gives mining companies and others interested some idea of the possibilities in the treatment, by differential flotation, of lead-zinc ores of the Coeur d'Alene region and other districts.

†B 206. Petroleum Laws of All America, by J. W. Thompson. 1921. 645 pp. Gives the last congressional and legislative enactments on petroleum operations, and the latest laws obtainable to the time of publication.

†B 207. The Analytical Distillation of Petroleum and Its Products, by E. W. Dean, H. H. Hill, N. A. C. Smith, and W. A. Jacobs. 1922. 82 pp., 3 pls., 33 figs. Discusses apparatus and procedure for the distillation analysis of petroleum. Intended as a guide in handling laboratory distillation problems.

†B 208. The Electrothermic Metallurgy of Zinc, by B. M. O'Harra. 1923. 106 pp., 2 pls., 39 figs. Describes furnaces and methods that have been used for smelting zinc ores.

†B 209. Fusibility of Ash from Coals in the United States, by W. A. Selvig and A. C. Fieldner. 1922. 119 pp., 2 pls., 3 figs. Discusses gas-furnace method, fusibility values, and fusibility of coal ash from mine and car samples.

†B 210. Oil Shale: An Historical, Technical, and Economic Study, State of Colorado Cooperative Oil-Shale Investigations, by M. J. Gavin. 1922. 201 pp., 18 pls., 4 figs. Presents pertinent facts regarding oil shale and gives results of investigations to date of publication.

†B 211. The Chloride Volatilization Process of Ore Treatment, by Thomas Varley, E. P. Barrett, C. C. Stevenson, and R. H. Bradford, with an introductory chapter by Stuart Croasdale. 1923. 99 pp., 7 pls., 5 figs. Outlines the history of the process of chloride volatilization and describes tests of numerous ores and chloridizing furnaces developed in this study.

†B 212. Analytical Methods for Certain Metals, Including Cerium, Thorium, Molybdenum, Tungsten, Radium, Uranium, Vanadium, Titanium, and Zirconium, by R. B. Moore, S. C. Lind, J. W. Marden, J. P. Bonardi, C. W. Davis, and J. E. Conley. 1923. 323 pp., 1 pl., 4 figs. Gives results of analytical work at the Rare and Precious Metals Experiment Station of the Bureau of Mines.

†B 213. Talc and Soapstone: Their Mining, Milling, Products, and Uses, by R. B. Ladoo. 1923. 133 pp., 15 pls., 23 figs. Describes characteristics, occurrence, and distribution, factors influencing new talc-mining ventures, methods, and equipment. Gives an outline of uses of talc and soapstone and factors controlling their use.

†B 214. Tests of Marine Boilers, by Henry Kreisinger, John Blizard, A. R. Mumford, B. J. Cross, W. R. Argyle, and R. A. Sherman. 1924. 309 pp., 11 pls., 165 figs. Gives results of tests of marine water-tube boiler and Scotch marine boiler and presents data that permit comparison of the two types of boilers.

†B 215. Timbering of Metal Mines, by E. A. Holbrook, R. V. Ageton, and H. E. Tufft. 1923. 72 pp., 17 pls., 43 figs. Discusses the general principles of mine timbering. Is intended chiefly for the practical miner or small operator.

†B 216. Bibliography of Petroleum and Allied Substances, 1919 and 1920, by E. H. Burroughs. 1923. 374 pp.

†B 217. Preparation, Transportation, and Combustion of Powdered Coal, published through the courtesy of the Canada Department of Mines, by John Blizard. 1923. 127 pp., 4 pls., 38 figs. Gives an account of the many methods, advantages, and disadvantages of preparing and burning powdered coal.

†B 218. The Technology of Slate, by Oliver Bowles. 1922. 132 pp., 6 pls., 41 figs. Points out the most efficient methods and equipment in use in slate quarries, describes methods of utilizing the quarried material to best advantage, and outlines means to reduce the proportion of waste. (See also RI 2766.)

†B 219. Explosives: Their Materials, Constitution, and Analysis, by C. A. Taylor and W. H. Rinkenbach. 1923. 188 pp. Does not replace former publications of the Bureau of Mines, but covers present methods employed in the industry and includes all classes of explosives and the materials used in their manufacture.

†B 220. Bibliography of Petroleum and Allied Substances, 1921, by E. H. Burroughs. 1923. 230 pp.

†B 221. Production and Briquetting of Carbonized Lignite, by E. J. Babcock and W. W. Odell. 1923. 82 pp., 8 pls., 4 figs. Outlines methods of lignite carbonization and briquetting and discusses commercial possibilities.

†B 222. The Metallurgy of Quicksilver, by L. H. Duschak and C. N. Schuette. 1925. 173 pp., 29 pls., 12 figs. Discusses results of the investigation carried out through the Pacific Experiment Station of the Bureau of Mines. Describes methods and furnaces in use. Treats of the health hazards in the extraction of quicksilver.

†B 223. An Investigation of Powdered Coal as Fuel for Power-Plant Boilers; Tests at Oneida Street Power Station, Milwaukee, Wis., by Henry Kreisinger, John Blizard, C. E. Augustine, and B. J. Cross. 1923. 92 pp., 48 figs. Presents the results of tests made on a 468-horsepower Edgemoor boiler fired with pulverized coal to determine what overall boiler efficiency could be obtained with pulverized coal under various conditions of furnace operation and with coal of different fineness and moisture content.

†B 224. Surface Machinery and Methods for Oil-Well Pumping, by H. C. George. 1925. 148 pp., 32 pls., 18 figs. Presents information by photographs and drawings which are described in the text. Gives cost of development and equipment of a typical oil-well property and discusses operating costs of oil wells.

†B 225. Stone Dusting or Rock Dusting to Prevent Coal-Dust Explosions, by G. S. Rice. 1924. 57 pp. Presents the results of a study of the subject during an investigation of mining conditions in Europe.

†B 226. The Treatment of Manganese-Silver Ores, by G. H. Clevenger and M. H. Caron. 1925. 110 pp., 13 pls., 4 figs. Gives results of tests made on a working scale and describes apparatus used.

†B 227. Flame Safety Lamps, by J. W. Paul, L. C. Ilsley, and E. J. Gleim. 1924. 212 pp., 32 pls., 22 figs. Relates the history of the development of the safety lamp. Gives Federal and State regulations in the United States and regulations adopted in European countries. Discusses the design, operation, and maintenance of flame lamps, describes lamp-testing stations, and gives results of tests in gaseous atmosphere, tests in internal igniters, candlepower measurements, and tests in dust-laden atmospheres. Gives reasons for the necessity of making methane tests and discusses apparatus and various methods.

†B 228. Estimation of Underground Oil Reserves by Oil-Well Production Curves, by W. W. Cutler, Jr. 1924. 114 pp., 2 pls., 26 figs. Discusses production-decline curve method for estimating recoverable underground reserves of oil and its use for solving operating problems. (See also RI 3479.)

†Out of print.

†B 229. Fifty-Nine Coal-Mine Fires; How They Were Fought and What They Teach, by G. S. Rice, J. W. Paul, and M. W. von Bernewitz. 1927. 156 pp., 61 figs. Covers a period of 16 years. Discusses practical methods of fire fighting in widely separated mines that differ greatly in underground conditions and range from anthracite to lignite mines. Suggests means to prevent mine fires.

†B 230. Analyses of Samples of Delivered Coal Collected from July 1, 1915, to January 1, 1922, with a chapter on the Tidewater Pool Classifications, by N. H. Snyder. 1923. 174 pp. Gives analyses and describes samples.

†B 231. Investigations of Toxic Gases from Mexican and Other High-Sulfur Petroleums and Products, by R. R. Sayers and others. 1925. 108 pp., 17 pls., 12 figs. Presents results of field work and laboratory studies. Discusses need for respiratory protection from petroleum gases and vapors and describes masks and breathing apparatus.

†B 232. Manual for Oil and Gas Operations, Including Operating Regulations to Govern the Production of Oil and Gas Under the Acts of February 25, 1920, June 4, 1920, March 4, 1923, and Under Special Agreement by the United States, by T. E. Swigart and C. E. Beecher. 1923. 145 pp., 21 pls., 10 figs. Points out types of oil and gas wastes and suggests methods in current practice for stopping these wastes. Outlines policies of the Interior Department on field operations.

†B 233. Protection of Oil and Gas Field Equipment Against Corrosion, by R. van A. Mills. 1925. 127 pp., 19 pls., 20 figs. Describes causes and effects of oil and gas field corrosion and outlines methods of combating it.

†B 234. Screen Sizing of Coal, Ores, and Other Minerals, by E. A. Holbrook and Thomas Fraser. 1925. 140 pp., 23 pls., 22 figs. Outlines present practice in screening coal and gives a brief historical résumé of the development of screening practice. Discusses coal-preparing machinery and gives data on screens for ore dressing.

†B 235. Mine Timber: Its Selection, Storage, Treatment, and Utilization, by R. R. Hornor and H. E. Tufft. 1925. 118 pp., 17 pls., 3 figs. Discusses the benefits of the proper handling of mine timbers and timber preservation.

†B 236. Plastic Magnesia, by O. C. Ralston, R. D. Pike, and L. H. Duschak. 1925. 111 pp., 13 pls., 27 figs. Gives results of tests made with Chewelah and other magnesites at the laboratories of the University of California in the endeavor to produce a plastic magnesia that would be satisfactory for making the so-called Sorel cement composition flooring, stucco, and plasters.

†B 237. Tests of a Large Boiler Fired with Powdered Coal at the Lakeside Station, Milwaukee, by Henry Kreisinger, John Blizard, C. E. Augustine, and B. J. Cross. 1925. 77 pp., 2 pls., 14 figs. Gives results of tests of a 4-pass Edgemoor boiler fired with powdered coal to determine the thermal efficiencies and capacities obtainable by burning powdered coal under large central-station boilers, and the possibility of operating such boilers continuously at high efficiency and capacity without destructive effect on the furnaces and without difficulties in refuse removal.

†B 238. Subsidence Due to Coal Mining in Illinois, by C. A. Herbert and J. J. Rutledge. 1927. 59 pp., 52 figs. Discusses investigations at four widely separated places where the longwall, the ordinary room-and-pillar, and the panel room-and-pillar systems were used.

†B 239. Iron-Ore (Hematite) Mining Practice in the Birmingham District, Alabama, by W. R. Crane. 1926. 143 pp., 87 figs. Discusses mining methods from early to recent practice and offers suggestions for improvements in mining methods.

†B 240. Electric Shot Firing in Mines, Quarries, and Tunnels, by L. C. Ilsley and A. B. Hooker. 1926. 139 pp., 72 figs. Gives a historical résumé, describes modern shot-firing equipment, discusses selection and use of accessories, results of tests, and regulations and laws covering ignition or detonation of explosives electrically.

†B 241. Coal-Mine Fatalities in the United States, 1923, by W. W. Adams. 1924. 88 pp. Gives all the fatal accidents described in reports of State inspectors, by States.

†B 242. Explosion Hazards in Industrial Plants Through the Use of Pulverized Coal, by L. D. Tracy. 1925. 103 pp., 36 figs. Presents the results of a study of pulverized-fuel systems and suggests regulations for safety in their operation.

†B 243. Diamond Drilling, with Special Reference to Oil-Field Prospecting and Development, by F. A. Edson. 1926. 170 pp., 39 figs. Describes machinery and tools used in diamond drilling, the operation of the diamond drill, and its application to oil-field work.

†B 244. Fluorspar: Its Mining, Milling, and Utilization, with a chapter on Cryolite, by R. B. Ladoo. 1927. 184 pp., 26 figs. Gives a comprehensive study of the industry as a whole.

†B 245. Mining of Thin Coal Beds in the Anthracite Region of Pennsylvania, by D. C. Ashmead. 1927. 113 pp., 57 figs. Describes methods now in use in coal beds 5 feet and less in thickness, points out what methods have been successful or unsuccessful, and discusses the opportunity for development of new mining methods.

†B 246. Quarry Accidents in the United States During the Calendar Year 1923, by W. W. Adams. 1925. 76 pp.

†B 247. Sources of Limestone, Gypsum, and Anhydrite for Dusting Coal Mines to Prevent Explosions, by Oliver Bowles. 1925. 70 pp., 15 pls. Gives information on the application of rock dust in mines, cost of dusting coal mines, sources of dusting materials, and analyses of quarry samples.

†B 248. Metal-Mine Accidents in the United States During the Calendar Year 1923, by W. W. Adams. 1925. 90 pp.

†B 249. Manual of Testing Methods for Oil Shale and Shale Oil, by L. C. Karrick. 1926. 70 pp., 24 figs. Discusses testing methods and the best way of applying them.

†B 250. Oil-Field Emulsions, by D. B. Dow. 1926. 112 pp., 41 figs. Deals with the cause and removal of water emulsified in crude petroleum and the colloidal theories involved.

†B 251. Coal-Mine Fatalities in the United States, 1924, by W. W. Adams. 1925. 95 pp. Gives all the fatal accidents described in reports of State inspectors, by States.

†B 252. Beneficiation and Utilization of Georgia Clays, by R. T. Stull and G. A. Bole. 1926. 72 pp., 23 figs. Discusses occurrence and use of Georgia clays and source of clays tested; gives results of washing and physical tests.

†B 253. Possibilities for the Commercial Utilization of Peat, by W. W. Odell and O. P. Hood. 1926. 160 pp., 6 pls., 23 figs. (Supersedes B 16.) Describes an investigation authorized by a congressional act to determine the practicability of the utilization of lignite coals and peat as a fuel and in producing commercial products.

†B 254. Smoke-Abatement Investigations at Salt Lake City, Utah, by Osborn Monnett, G. St. J. Perrott, and H. W. Clark. 1926. 98 pp., 24 figs. Describes the method advocated by the Bureau of Mines for a

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smoke-abatement campaign in a city of the size of Salt Lake City.

†B 255. Investigations of the Preparation and Use of Lignite, 1918–25, by O. P. Hood and W. W. Odell. 1926. 204 pp., 15 pls., 20 figs. Discusses an investigation made in compliance with the act of Congress of February 25, 1919.

†B 256. Garnet: Its Mining, Milling, and Utilization, by W. M. Myers and C. O. Anderson. 1925. 54 pp., 3 pls., 3 figs. Discusses the results of an investigation conducted by the Bureau of Mines.

†B 257. Review of Safety and Health Conditions in the Mines at Butte, by G. S. Rice and R. R. Sayers. 1925. 29 pp., 2 pls., 4 figs. Prepared from data gathered during the period 1916 to 1924, inclusive, by Daniel Harrington, supplemented by material obtained by other investigators and by the notes of the authors made during their visit to the mines in 1924.

†B 258. Suggestions for the Design of Electrical Accessories for Permissible Mining Equipment, by L. C. Ilsley and E. J. Gleim. 1926. 47 pp., 21 figs. Discusses the good and the bad features of accessories used in permissible mining outfits.

†B 259. Placer-Mining Methods and Costs in Alaska, by N. L. Wimmler, 1927. 236 pp., 70 figs. Discusses present conditions in Alaska placer mining, the methods employed, and the costs. Helpful to placer miners, engineers, and all others interested in the industry.

†B 260. The Ferric Sulfate-Sulfuric Acid Process, by O. C. Ralston, with a chapter on Producing Small Bubbles of Gas in Liquids by Submerged Orifices, by C. G. Maier. 1927. 122 pp., 71 figs. Describes the process for preparing solutions of ferric sulfate or sulfuric acid by passing a mixture of air and sulfur dioxide, preferably in the form of very small bubbles, through solutions containing varying amounts of iron as sulfate. Comprises a study of the chemistry of the process and the mechanical conditions that would have to be observed in practice.

†B 261. Resistance of Metal-Mine Airways, by G. E. McElroy and A. S. Richardson. 1927. 145 pp., 71 figs. Describes methods used and results obtained in a series of experiments on the resistance that metal-mine airways offer to the flow of air.

†B 262. Underground Limestone Mining, by J. R. Thoenen. 1926. 100 pp., 72 figs. Intended to be of service to superintendents of limestone mines and quarry operators who contemplate adopting underground methods.

†B 263. Quarry Accidents in the United States During the Calendar Year 1924, by W. W. Adams. 1926. 76 pp.

†B 264. Metal-Mine Accidents in the United States During the Calendar Year 1924, by W. W. Adams. 1926. 98 pp.

B 265. Leakage from High-Pressure Natural-Gas Transmission Lines, by E. L. Rawlins and L. D. Wosk. 1928. 106 pp., 32 figs. Describes methods of determining leakage from natural-gas lines and suggests remedial measures. 45 cents.

†B 266. Technology and Uses of Silica and Sand, by W. M. Weigel. 1927. 199 pp., 50 figs. Summarizes mining or quarrying methods and uses.

†B 267. Acid Process for the Extraction of Alumina, by G. S. Tilley, R. W. Millar, and O. C. Ralston. 1927. 85 pp. Discusses not only the sulfuric acid processes of chief interest, but also reviews all the other work with hydrochloric and nitric acids.

†B 268. Coal-Dust Explosion Tests in the Experimental Mine, 1919 to 1924, Inclusive, by G. S. Rice, J. W. Paul, and H. P. Greenwald. 1927. 176 pp., 31 figs. Describes the third series of coal-dust explosion tests. (See also B 56 and 167.)

†B 269. Quarry Problems in the Lime Industry, by Oliver Bowles and W. M. Myers. 1927. 93 pp., 34 figs. Describes general methods of operation and gives typical illustrations. Is intended to assist manufacturers of lime in correcting errors and establishing their industry on the most economical and efficient basis.

†B 270. Production of Sponge Iron, by C. E. Williams, E. P. Barrett, and B. M. Larsen. 1927. 175 pp., 48 figs. Reviews sponge-iron processes, gives fundamental data on reduction of iron oxides and results of tests, and discusses the economics of sponge-iron production.

†B 271. Problems in the Firing of Refractories, by G. A. Bole, John Blizard, W. E. Rice, E. P. Ogden, and R. A. Sherman. 1927. 197 pp., 56 figs. Presents the results of an investigation begun in February 1923, by the Bureau of Mines, in cooperation with a technical committee selected by the Refractories Manufacturers' Association.

†B 272. Safeguarding Workmen at Oil Derricks, by H. C. Miller. 1927. 111 pp., 86 figs. Deals with safe principles of derrick construction and the safety devices and safeguards found on and in the derrick. (See TP 369.)

B 273. Drilling and Blasting in Opencut Copper Mines, by E. D. Gardner. 1927. 95 pp., 57 figs. Gives descriptions and comparisons of drilling and blasting methods at the six opencut mines visited in Utah, Nevada, New Mexico, and Arizona during 1922, 1923, 1924, and 1925. 30 cents.

†B 274. Potash Mining in Germany and France, by G. S. Rice and J. A. Davis. 1927. 92 pp., 23 figs. Discusses methods of mining potash salts in France and Germany and the geology of the deposits. Gives a brief history of the German and French potash industry, a short description of the refining of crude salts for export, and an estimate of the cost of production. Is based on data obtained during visits to France and Germany during 1911 and 1923, supplemented by information from articles and books on the subjects.

†B 275. Coal-Mine Fatalities in the United States, 1925, by W. W. Adams. 1926. 129 pp.

†B 276. Five Hundred Tests of Various Coals in House-Heating Boilers, by P. Nicholls, S. B. Flagg, and C. E. Augustine. 1928. 70 pp., 12 figs. Includes comprehensive analytical table annotated to show results of burning tests of coals.

†B 277. Safety in Coal Mining (A Handbook), by G. S. Rice. 1928. 141 pp., 1 fig. Presents in convenient form a concise statement of practices and methods recommended by the Bureau of Mines for the increase of safety in coal mining.

†B 278. Magnetic Concentration of Iron Ores of Alabama, by Oscar Lee, B. W. Gandrud, and F. D. De Vaney. 1927. 75 pp., 18 figs. Discusses results of tests of high-silica red ores and high-silica gray hematite. Also discusses tests of flue dusts of the Birmingham district.

B 279. Limits of Inflammability of Gases and Vapors, by H. F. Coward and G. W. Jones. Revised and enlarged, 1931 and 1939. 146 pp., 44 figs. Presents results of cooperative study begun in 1924 between Safety in Mines Research Board of Great Britain and Bureau of Mines, United States Department of the Interior. Results are of great value to industries handling inflammable gas and are especially valuable in problems concerning safety in coal mining, as they determine with some precision limits of inflammability of inflammable gas mixtures. Some of the tests give new figures; others confirm former determinations. (See also TP 450 and RI 3172.)

†Out of print.

†B 280. Petroleum Refinery Statistics, 1916–25, by G. R. Hopkins. 1927. 141 pp., 5 figs. Records all past data presented on the recently adopted basis of barrels instead of gallons.

†B 281. The Precipitation of Lead and Copper from Solution on Sponge Iron, by G. L. Oldright, H. E. Keyes, Virgil Miller, and W. A. Sloan. 1928. 131 pp., 43 figs. Presents the results of experiments on the hydrometallurgy of lead at the Salt Lake City station of Bureau of Mines and the results of experiments on the hydrometallurgy of copper at the Tucson (Ariz.) Station.

†B 282. Metal-Mine Accidents in the United States During the Calendar Year 1925, by W. W. Adams. 1927. 120 pp.

†B 283. Coal-Mine Fatalities in the United States, 1926, by W. W. Adams. 1927. 121 pp.

†B 284. Production and Development Problems in the Powell Oil Field, Navarro County, Tex., by H. B. Hill and C. E. Sutton. 1928. 123 pp., 35 figs. Presents the results of a detailed study that was made primarily to obtain a better working knowledge of the major features, involving structural conditions, the character and nature of the Woodbine pay sand, and the source of water. A complete and reliable compilation of data.

†B 285. Coal-Mine Ventilation Factors, by H. P. Greenwald and G. E. McElroy. 1929. 106 pp., 47 figs. Describes testing equipment and methods used in the Bureau's Experimental mine at Bruceton and presents data on pressure losses caused by the resistance of coal-mine entries to the flow of air under various practical conditions on resistance of right-angle bends and on resistance caused by canvas brattices.

†B 286. Quarry Accidents in the United States During the Calendar Year 1925, by W. W. Adams. 1927. 98 pp.

†B 287. Gases from Blasting in Tunnels and Metal-Mine Drifts, by E. D. Gardner, S. P. Howell, and G. W. Jones. 1927. 96 pp., 14 figs. Gives the results of sampling the gases from blasting drift rounds at five mines; describes the rounds blasted and the methods of sampling and analyzing the gases.

†B 288. Quarry Accidents in the United States During the Calendar Year 1926, by W. W. Adams. 1928. 89 pp.

†B 289. Petroleum Refinery Statistics, 1926, by G. R. Hopkins. 1927. 92 pp., 4 figs.

†B 290. Bibliography of Petroleum and Allied Substances, 1922 and 1923, by H. Britton. 1929. 667 pp.

†B 291. Tabulated Analyses of Representative Crude Petroleums of the United States, by N. A. C. Smith and E. C. Lane. 1928. 69 pp. Presents the analyses of more than 300 typical crude oils, all produced within the United States. One of a series of reports, which, taken as a whole, will present a comprehensive picture of the characteristics of crude petroleum.

†B 292. Metal-Mine Accidents in the United States During the Calendar Year 1926, by W. W. Adams. 1928. 119 pp.

†B 293. Coal-Mine Fatalities in the United States, 1927, by W. W. Adams. 1928. 120 pp.

†B 294. Carburetion of Combustible Gas with Butane and Propane-Butane Mixtures, with Particular Reference to the Carburetion of Water Gas, by W. W. Odell. 1929. 96 pp., 18 figs. Presents results of exhaustive investigations at manufactured-gas plants to determine the feasibility of using hydrocarbons having low boiling points and high pressures to replace gas oil in the enrichment of lean gas.

†B 295. Subsidence and Ground Movement in the Copper and Iron Mines of the Upper Peninsula, Michigan, by W. R. Crane. 1929. 66 pp., 49 figs. Gives data on the factors that control the movement of rock. Presents information by photographs and drawings of various typical examples and describes methods of procedure in failures in and about mines.

†B 296. Iron Oxide Reduction Equilibria, a Critique from the Standpoint of the Phase Rule and Thermodynamics, by O. C. Ralston. 1929. 326 pp., 112 figs. Presents the properties of the common oxides of iron, their combinations with each other, and reduction-equilibrium diagrams. Includes a critical discussion of existing scattered data and occasional new data that have been collected by the Bureau of Mines.

†B 297. Petroleum Refinery Statistics, 1927, by G. R. Hopkins. 1929. 93 pp., 4 figs.

†B 298. Methods, Costs, and Safety in Stripping and Mining Coal, Copper Ore, Iron Ore, Bauxite, and Pebble Phosphate, by F. E. Cash and M. W. von Bernewitz. 1929. 275 pp., 120 figs. Gives the results of investigations of this form of mining and suggests means to prevent accidents.

†B 299. Metallurgical Limestone, Problems in Production and Utilization, by Oliver Bowles. 1929. 40 pp., 4 figs. Is intended for limestone operators and metallurgists. Covers distribution and transportation, production statistics, and utilization and production problems.

†B 300. Coal-Washing Investigations: Methods and Tests, by H. F. Yancey and Thomas Fraser. 1929. 259 pp., 48 figs. Presents the results of investigations to determine the washability of the various types of American coals and the treatment best suited to each.

†B 301. Facts Relating to the Production and Substitution of Manufactured Gas for Natural Gas, by W. W. Odell. 1929. 179 pp., 35 figs. Discusses general conditions that have been studied to aid in the better utilization of our fuel resources and the production of low-priced manufactured gas as well as to disseminate information relating to the supply of natural gas, the cost of other fuels, and the approximate costs of producing and distributing different kinds of manufactured city gas.

†B 302. Fuel-Efficiency Tests on Batch Oil Stills, by Henry Kreisinger, W. R. Argyle, and W. E. Rice. 1929. 94 pp., 48 figs. Presents in condensed form the results of cooperative tests made to determine with what efficiency fuel was being used and what could be done to improve it.

†B 303. Tests of Strength of Roof Supports Used in Anthracite Mines of Pennsylvania, by G. S. Rice and Charles Enzian. 1929. 44 pp., 30 figs. Describes tests to determine the compressive strength of artificial roof supports of various kinds used in the mining of anthracite in Pennsylvania.

†B 304. Ochers and Mineral Pigments of the Pacific Northwest: Occurrence, Possible Methods of Preparation, and Testing of Ochers, Siennas, and Colored Clays, by Hewitt Wilson. 1929. 74 pp., 18 figs. Gives a review of the nomenclature, sources, imports, statistics, common methods of preparation, and testing of mineral pigments. Discusses an investigation undertaken to determine whether the local materials had the proper characteristics to meet the competition of materials already on the market from other districts.

†B 305. Inspection and Testing of Mine-Type Electrical Equipment for Permissibility, by L. C. Ilsley, E. J. Gleim, and H. B. Brunot. 1929. 26 pp., 6 figs. Revised as IC 7185.

†B 306. Mining Methods and Practice in the Michigan Copper Mines, by W. R. Crane. 1929. 192 pp., 147 figs. Considers mining methods historically, from early to present practice.

†B 307. Flow of Gases Through Beds of Broken Solids, by C. C. Furnas. 1929. 144 pp., 79 figs. Treats of the first phase of a laboratory study of blast-furnace phenomena undertaken with the intention of even-

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tually formulating a more or less complete quantitative theory of the physical and chemical reactions within the furnace.

†B 308. Oxides in Pig Iron: Their Origin and Action in the Steel-Making Process, by C. H. Herty, Jr., and J. M. Gaines, Jr. 1929. 56 pp., 16 figs. Describes the tests. Gives tables of details, log sheets of heats, and application of the Dickinson method to the extraction of silicates from pig iron.

†B 309. Rock Bursts in the Lake Superior Copper Mines, Keweenaw Point, Mich., by W. R. Crane. 1929. 43 pp., 31 figs. Discusses cause and occurrence of rock bursts and suggests protective measures.

†B 310. Metal-Mine Accidents in the United States During the Calendar Year 1927, by W. W. Adams. 1929. 96 pp.

†B 311. Drilling and Blasting in Metal-Mine Drifts and Crosscuts, by E. D. Gardner. 1929. 170 pp., 63 figs. Shows the results obtained and conclusions drawn from observing the blasting of 108 rounds at 18 mines in 6 different States.

†B 312. Bauxite: Float-and-Sink Fractionations and Flotation Experiments, by B. W. Gandrud and F. D. De Vaney. 1929. 101 pp., 6 figs. Presents the results of an investigation of the physical properties and characteristics of bauxite, with special reference to the possibility of applying commercial methods concentration to low-grade bauxite.

†B 313. Permissible Storage-Battery Locomotives and Power Trucks, by L. C. Ilsley, E. J. Gleim, and H. B. Brunot. 1929. 120 pp., 49 figs. Gives essential data in regard to the construction of approved storage-battery locomotives and power trucks.

†B 314. Quarry Accidents in the United States During the Calendar Year 1927, by W. W. Adams. 1929. 109 pp.

†B 315. Construction and Operation of the Bureau of Mines Experimental Oil-Shale Plant, 1925–27, by M. J. Gavin and J. S. Desmond. 1930. 154 pp., 59 figs. Makes particular reference to the retorts and directs attention to difficulties encountered in retorting and the best means of avoiding them. Describes the nature of the product obtained and summarizes refining studies.

†B 316. Commercial Possibilities of the Texas-New Mexico Potash Deposits, by J. S. Wroth. 1930. 144 pp., 5 figs. Describes results of Government core-drilling tests in Texas and New Mexico and offers a comprehensive schedule of costs for all phases of the mining and treatment of polyhalite.

†B 317. Rock-Strata Gases of the Cripple Creek District, Colo., and Their Effect on Mining, by E. H. Denny, K. L. Marshall, A. C. Fieldner, A. H. Emery, W. P. Yant, and W. A. Selvig. 1930. 66 pp., 21 figs. Presents results of field and laboratory studies and suggests safety measures to reduce the hazards due to rock gases.

†B 318. Petroleum Refinery Statistics, 1928, by G. R. Hopkins. 1930. 123 pp., 17 figs.

†B 319. Coal-Mine Fatalities in the United States, 1928, by W. W. Adams. 1929. 125 pp.

†B 320. Metal-Mine Accidents in the United States During the Calendar Year 1928, by W. W. Adams. 1930. 102 pp.

†B 321. Innovations in Copper Leaching Employing Ferric Sulfate-Sulfuric Acid, by Harmon E. Keyes. 1930. 67 pp., 23 figs. Presents the results of experiments that were made at the Tucson station of the Bureau of Mines to complete the program of developing a cheap and efficient solvent that would meet the requirements of smaller plants.

†B 322. Effect of Vacuum on Oil Wells, by B. E. Lindsly and W. B. Berwald. 1930. 188 pp., 61 figs. Presents results of investigations to determine the nature, power, and action of vacuum; urges the importance of the correct application of vacuum to obtain increased recovery of oil.

†B 323. Gas-Lift Method of Flowing Oil Wells (California Practice), by H. C. Miller. 1930. 118 pp., 45 figs. Presents data of actual gas-lift operations. Points out operating facts and generalized practices.

†B 324. Zinc Smelting from a Chemical and Thermodynamic Viewpoint, by C. G. Maier. 1930. 93 pp., 19 figs. Shows, with some detail, the application of newly recalculated theoretical data to the general chemistry of zinc reduction in smelting. Also discloses the manner in which information on the statics of reduction may be used in certain cases to study a dynamic process.

†B 325. Quarry Accidents in the United States During the Calendar Year 1928, by W. W. Adams. 1930. 103 pp.

†B 326. Explosives Accidents in the Anthracite Mines of Pennsylvania, 1923–27, by S. P. Howell, 1931. 93 pp., 3 figs. Presents the results of a technical statistical study of all fatal and serious accidents in which explosives were involved in the anthracite region of Pennsylvania during the calendar years 1923 to 1927, inclusive, to determine the nature of explosives accidents and to devise means for preventing similar accidents in the Pennsylvania anthracite mines.

†B 327. Potash Bibliography to 1928 (Annotated), by J. F. T. Berliner. 1930. 578 pp. Review and compilation of technical literature on potash salts (including the alunites) and their foreign occurrences.

†B 328. Greensand Bibliography to 1930 (Annotated), with a chapter on Zeolite Water Softeners, by R. N. Shreve. 1930. 78 pp. Includes all articles of any importance and all references of even minor importance to American occurrence.

†B 329. Agglomeration and Leaching of Slimes and Other Finely Divided Ores, by J. D. Sullivan and A. P. Towne. 1930. 60 pp., 8 figs. Presents experimental data to show what may be expected when leaching on a large scale under conditions approximating those in practice.

†B 330. Ventilation of the Large Copper Mines of Arizona, by G. E. McElroy. 1930. 145 pp., 42 figs. Discusses ventilation methods, practices, and costs at 11 large copper mines.

†B 331. Permissible Methane Detectors, by A. B. Hooker, W. J. Fene, and R. D. Currie. 1931. 30 pp., 16 figs. Presents to the mining public the results of the permissibility tests of the detectors that have been approved; also gives the results of a series of tests conducted to determine their practicability. (See also RI 3359.)

†B 332. Permissible Electric Mine Lamps, by L. C. Ilsley and A. B. Hooker. 1930. 39 pp., 28 figs. Gives a brief account of the introduction of electric lighting in mines and discusses the lamp-approval work of the Bureau of Mines. (See also RI 3304.)

†B 333. Refining of Light Petroleum Distillates, by H. P. Rue and R. H. Espach. 1931. 111 pp., 42 figs. Deals with the principal methods of refining light petroleum products, the equipment used, and the effects of the different refining agents. Discusses a study of the value of fractionation as an aid to the refining of pressure distillates. Gives the results of fractionating pressure distillates in an experimental bubble tower, dividing the gasoline into two or more fractions, and treats of the value of fractionation in facilitating the refining of the gasoline fractions.

†B 334. A Study of Refractories Service Conditions in Boiler Furnaces, by R. A. Sherman. 1931. 144 pp.,

†Out of print.

76 figs. Describes results of preliminary survey of factors determining life of refractories, discusses in detail fuels, furnaces, and conditions of service, correlates conditions of service with service life, and covers design and construction of boiler furnaces.

†B 335. Quicksilver, by C. N. Schuette. 1931. 168 pp., 56 figs. Report of the study of the production of quicksilver, the principal aspects of which include developing and mining of the ore bodies, the metallurgy of quicksilver ores, and the economics of the industry as a whole. Discusses and illustrates types of equipment and underlying principles of operation.

†B 336. Agglutinating, Coking, and Byproduct Tests of Coals from Pierce County, Wash., by S. M. Marshall and B. M. Bird. 1931. 31 pp., 13 figs. Describes one phase of a comprehensive investigation to determine whether coals from an extensive undeveloped area of Pierce County, Wash., can be used in the manufacture of coke for the iron blast furnace.

†B 337. Jigging, Classification, Tabling, and Flotation Tests of Coals Presenting Difficult Washing Problems, with Particular Reference to Coals from Pierce County, Wash., by B. M. Bird and S. M. Marshall. 1931. 132 pp., 95 figs. Describes the investigation and summarizes the most important results. Gives detailed data of the best of the washing tests by each process. Describes hindered-settling classifier which was developed during this investigation. Discusses new system of riffling coal-washing tables and method for adjusting coal-washing tables based upon the distribution of the products.

†B 338. Quarry Accidents in the United States During the Calendar Year 1929, by W. W. Adams. 1931. 104 pp.

†B 339. Petroleum Refinery Statistics, 1929, by G. R. Hopkins. 1931. 125 pp., 18 figs.

†B 340. Relationship Between Oxidizability and Composition of Coal, by Wilfrid Francis and H. M. Morris. 1931. 44 pp., 5 figs. Tabulates results of tests.

†B 341. Coal-Mine Fatalities in the United States, 1929, by W. W. Adams. 1931. 120 pp.

†B 342. Metal-Mine Accidents in the United States During the Calendar Year 1929, by W. W. Adams. 1931. 99 pp., 1 fig.

†B 343. Permissible Coal-Handling Equipment Approvided from January 1926 to December 1930, Inclusive, by L. C. Ilsley, E. J. Gleim, and H. B. Brunot. 1931. 91 pp., 29 figs. Permissible loading machines and conveyors included in the Bureau's list of approved equipment are described to indicate to mine operators and manufacturers not only the types available but to show to some extent the special features employed in designing machines that minimize the hazard of gas and dust ignitions.

†B 344. Methods and Apparatus Used in Determining the Gas-, Coke-, and Byproduct-Making Properties of American Coals, with Results on a Taggart Bed Coal from Roda, Wise County, Va., by A. C. Fieldner, J. D. Davis, R. Thiessen, E. B. Kester, and W. A. Selvig. 1931. 107 pp., 53 figs. Describes in some detail the methods and apparatus used.

†B 345. Concrete Stoppings in Coal Mines for Resisting Explosions: Detailed Tests of Typical Stoppings and Strength of Coal as a Buttress, by G. S. Rice, H. P. Greenwald, H. C. Howarth, and S. Avins. 1931. 63 pp., 41 figs. Gives the details of tests to determine the design of stoppings capable of withstanding a pressure, applied to either side, of 50 pounds per square inch, as required by section 104 (a) of the Operating Regulations to Govern Coal-Mining Methods on Leased Lands on the Public Domain, issued in 1921.

†B 346. Physical Testing of Explosives at the Bureau of Mines Explosives Experiment Station, Bruceton, Pa., by C. E. Munroe and J. E. Tiffany, 1931. 148 pp., 48 figs. Supersedes TP 186 and brings together descriptions of testing devices and the methods of using them as described in the Bureau publications cited in the text, especially B 15 and TP 234, which like TP 186 are now out of print. These devices and methods having been modified with experience, they are here described as they are at present.

†B 347. Gases That Occur in Metal Mines, by D. Harrington and E. R. Denny. 1931. 21 pp. Discusses investigations of various gases in metal mines and tunnels. Recommends safety measures to be applied.

†B 348. Paraffin and Congealing Oil Problems, by C. E. Reistle, Jr., with a chapter on a Laboratory Study of Rod Waxes, by C. E. Reistle, Jr., and O. C. Blade. 1932. 171 pp., 64 figs. The first part discusses the results obtained from field studies of the factors responsible for the deposition of paraffin and the congealing of oil and of practical methods of combating these problems. The second part deals with the analyses of crude waxes or paraffin obtained from different representative crude oils.

†B 349. Liquid-Oxygen Explosives, by G. St. J. Perrott and N. A. Tolch. 1932. 88 pp., 36 figs. Deals with the advantages and disadvantages of L. O. X., both in the light of experimental investigations by the Bureau of Mines and the results in actual blasting, and discusses the probable future fields of usefulness for this novel type of explosive.

†B 350. Contributions to the Data on Theoretical Metallurgy. I. The Entropies of Inorganic Substances, by K. K. Kelley. 1932. 63 pp., 1 fig. Deals with the entropies of metallurgically important substances. Gives values of the entropies at 298.1° K. (25° C.) of elements and common compounds, such as oxides and sulfides, for which the necessary data are at present available and calls attention to means of obtaining approximate values when data are lacking. Furnishes a schedule on which data that may become available in the future can be inserted. (See also B 371, 383, 384, 393, 394, 406, 407, and 434.)

†B 351. Mining Petroleum by Underground Methods; a Study of Some Methods Used in France and Germany and Possible Application to Depleted Oil Fields Under American Conditions, by G. S. Rice. 1932. 159 pp., 38 figs. Concludes that where conditions are favorable, mining methods in depleted oil fields may bring large financial returns and recover oil that might otherwise be lost.

†B 352. Safety Practices in California Gold Dredging, by S. H. Ash. 1932. 31 pp., 10 figs. Discusses accident-prevention methods, tabulates accident statistics, and gives safety rules of California Industrial Accident Commission. (See B 470.)

†B 353. Tests of Rock-Dust Barriers in the Experimental Mine, by G. S. Rice, H. P. Greenwald, and H. C. Howarth. 1932. 81 pp., 28 figs. Describes the tests and summarizes results. Discusses qualities of effective barriers and barrier installations in commercial mines. (See also B 369.)

†B 354. The Ignition of Firedamp by Explosives. A Study of the Process of Ignition by the Schlieren Method, by W. C. F. Shepherd. 1932. 89 pp., 35 figs. Gives results of research to develop a new method of studying the phenomena produced on firing explosives in inflammable atmospheres. Information was obtained on the behavior of the pressure waves, the flame, and the products of detonation that result from the firing of an explosive.

†B 355. Coal-Mine Accidents in the United States, 1930, by W. W. Adams, L. E. Geyer, and L. Chenoweth. 1932. 114 pp.

†Out of print.

†B 356. Sampling and Estimation of Ore Deposits, by C. F. Jackson and J. B. Knaebel. 1932. 155 pp., 35 figs. Outlines methods employed and pitfalls to avoid, presents examples of modern practice as a guide to future work, and indicates accuracy that may be expected under various conditions.

†B 357. Shaft-Sinking Practices and Costs, by E. D. Gardner and J. F. Johnson. 1932. 104 pp., 49 figs. One of a series of papers on mining practices and costs. Discusses the best methods of performing all phases of shaft sinking, with particular attention to the practices at metal mines.

†B 358. Rubber-Sheathed Trailing Cables, by L. C. Ilsley, A. B. Hooker, and E. J. Coggeshall. 1932. 53 pp., 28 figs. Records activities of the Bureau of Mines covering several years and reflects its endeavor to be of service to the coal-mining industry in procuring safer trailing cables for use on permissible machines.

†B 359. Permissible Electric Cap Lamps and Ventilation in Certain California Mines and Water-Tunnel Construction, by S. H. Ash and J. H. Rankin. 1932. 36 pp., 12 figs. Concludes that it is safer, more efficient, and more practical to use exhaust systems of ventilation where explosive or asphyxial gas is encountered, either at the face, or particularly away from it; also that the use of portable electric cap lamps is less costly, safer, and more efficient under the circumstances described than any incandescent lighting system that involves wiring.

B 360. Removal of Soot from Furnaces and Flues by the Use of Salts or Compounds, by P. Nicholls and C. W. Staples. 1932. 76 pp., 18 figs. Gives a general summary of the conclusions reached in the investigation in a form useful to those desiring to know the possibilities in this method of soot removal; a list of the composition of compounds which have been proposed, patented, or sold; and a detailed report of the tests made and the results obtained. 25 cents.

†B 361. Heat Transfer from a Gas Stream to a Bed of Broken Solids, by C. C. Furnas. 1932. 88 pp., 35 figs. Presents data covering a considerable range of materials, particle sizes, gas velocities, and temperatures in a general form so that they may be used for any type of system similar to one studied.

†B 362. Metal-Mine Accidents in the United States During the Calendar Year 1930, by W. W. Adams. 1932. 99 pp.

†B 363. Gold Mining and Milling in the United States and Canada, Current Practices and Costs, by C. F. Jackson and J. B. Knaebel. 1932. 151 pp., 54 figs. Deals with prospecting, development, mining, and milling of lode-gold ores and contains a brief discussion of placer mining. It is the first of a series of summary bulletins, which dealt particularly with production methods, as well as costs per ton of different metallic ores mined and per unit of metal recovered.

†B 364. Clinker Formation as Related to the Fusibility of Coal Ash, by P. Nicholls and W. A. Selvig, with appendix by E. B. Ricketts. 1932. 71 pp., 26 figs. First part covers chemical and physical tests of average samples of coals used—chemical analysis, float-and-sink tests to determine distribution of ash, determination of forms of sulfur, chemical analysis of ash, and ash-fusibility determinations. Second part includes clinkering studies and comparisons of results with ash-fusibility and other tests.

†B 365. Laboratory Testing of Inflammability of Coal and Other Dusts Conducted by the Bureau of Mines, by H. P. Greenwald, with foreword by G. S. Rice. 1932. 45 pp., 14 figs. Historical review of laboratory testing of coal by Bureau of Mines. (See also B 389.)

†Out of print.

†B 366. Quarry Accidents in the United States During the Calendar Year 1930, by W. W. Adams. 1932. 88 pp.

†B 367. Petroleum-Refinery Statistics, 1930, by G. R. Hopkins. 1932. 104 pp., 18 figs.

†B 368. Static Electricity in Nature and Industry, by P. G. Guest. 1933. 98 pp., 11 figs. Although scope of this report is rather broad, it deals primarily with static electricity as a hazard. Gives casual and experimental observations for background and for purpose of suggesting hazards not yet recognized. Emphasizes electrification and possibility of spark discharge.

†B 369. Explosion Tests of Pittsburgh Coal Dust in the Experimental Mine, 1925 to 1932, Inclusive, by G. S. Rice, H. P. Greenwald, and H. C. Howarth. 1933. 44 pp., 11 figs. Second of series of bulletins dealing with subdivisions of general problem of explosibility of coal dust and prevention of explosions in coal mines. Reports tests to determine effect on explosibility of Pittsburgh coal dust of altering conditions under which tests were made. (See also B 353.)

†B 370. Iron Oxide Mineral Pigments of the United States, by Hewitt Wilson. 1933. 198 pp., 34 figs. Reviews occurrence of mineral pigments and allied iron ores and nomenclature and common methods of classifying and testing many commercial mineral pigments used in this country.

†B 371. Contributions to the Data on Theoretical Metallurgy. II. High-Temperature Specific-Heat Equations for Inorganic Substances, by K. K. Kelley. 1933. 78 pp. Reviews available high-temperature thermal data on inorganic compounds and gives representative specific-heat equations valid at high temperatures for use in thermodynamic calculations. (See also B 350, 383, 384, 393, 394, 406, 407, and 434.)

†B 372. Accounting System and Office-Management Procedure for Medium-Size Metal Mines, by Albert E. Keller. 1933. 84 pp., 50 figs. Discusses system particularly adapted to needs of medium-size mines that ship their crude ore direct to smelters or to ore-purchasing companies without processing or treatment, and that operate under centralized home-office control plan.

†B 373. Coal-Mine Accidents in the United States, 1931, by W. W. Adams, L. E. Geyer, and L. Chenoweth. 1933. 104 pp.

†B 374. Metal-Mine Accidents in the United States During the Calendar Year 1931, by W. W. Adams. 1933. 36 pp.

†B 375. Quarry Accidents in the United States During the Calendar Year 1931, by W. W. Adams. 1933. 50 pp.

†B 376. Quarry Accidents in the United States During the Calendar Year 1932, by W. W. Adams. 1933. 59 pp.

†B 377. Metal-Mine Accidents in the United States During the Calendar Year 1932, by W. W. Adams. 1933. 43 pp.

†B 378. Underfeed Combustion, Effect of Preheat, and Distribution of Ash in Fuel Beds, by P. Nicholls. 1934. 76 pp., 29 figs. One of series of investigations on burning of solid fuels to measure reactions in fuel beds in burning of fuel and in clinkering of its ash. Report covers studies of underfeed-type fuel bed—exemplified by underfeed stokers—and of the effect of preheated air on what transpires in both overfeed and underfeed fuel beds.

B 379. Applied Methods and Equipment for Reducing Evaporation Losses of Petroleum and Gasoline, by Ludwig Schmidt. 1934. 160 pp., 63 figs. Evaporation of crude petroleum and gasoline is one of most important sources of loss to oil industry. Bulletin summarizes approved methods and equipment for reducing these losses. Discusses theory of evaporation; methods of determining evaporation losses; lease operation; transportation and storage of crude

petroleum; and evaporation losses of gasoline at refineries. 60 cents.

†B 380. Coal-Mine Accidents in the United State, 1932, by W. W. Adams and L. E. Geyer. 1934. 87 pp.

†B 381. Lead and Zinc Mining and Milling in the United States; Current Practices and Costs, by Chas. F. Jackson, John B. Knaebel, and C. A. Wright. 1935. 204 pp., 59 figs. One of a series on mining and milling of ores of the principal metals. They summarize the results of 4 years of field study in the most important mining districts of the United States and of a series of information circulars published by the Bureau dealing with operating methods and costs at a large number of individual mines and milling plants. This bulletin combines in a single volume discussions of the winning of lead and zinc ores from the mines and of the milling of the ores with descriptions of practices at typical properties in the United States.

†B 382. Permissible Coal-Cutting Equipment Approved Prior to July 1, 1932, by L. C. Ilsley, H. B. Brunot, and H. B. Freeman. 1935. 129 pp., 27 figs. The third in a series covering permissible motor-driven machinery; describes the explosion-proof features of all the coal-cutting machines (including those given in B 78) approved prior to July 1, 1932.

†B 383. Contributions to the Data on Theoretical Metallurgy. III. The Free Energies of Vaporization and Vapor Pressures of Inorganic Substances, by K. K. Kelley. 1935. 132 pp. Discusses methods used in heat and free energy of vaporization calculations; gives heat and free energy of vaporization equations for all the elements and inorganic compounds for which the necessary data are available; and summarizes vapor-pressure results for substances discussed. Contains a bibliography of vapor-pressure data, complete so far as possible up to April 1934. (See also B 350, 371, 384, 393, 394, 406, 407, and 434.)

†B 384. Contributions to the Data on Theoretical Metallurgy. IV. Metal Carbonates—Correlations and Applications of Thermodynamic Properties, by K. K. Kelley and C. T. Anderson. 1935. 73 pp. Assembles existing thermodynamic data for carbonates and correlates so far as possible the results of decomposition-pressure determinations with the calorimetrically determined heats of formation and entropy values on the one hand and with solubility and standard electrode-potential data on the other. (See also B 383.)

B 385. Engineering Factors in the Ventilation of Metal Mines, by G. E. McElroy. 1935. 196 pp., 68 figs. Discusses the engineering aspects of metal-mine ventilation. Presents the subject to mine operators and students interested in mine ventilation in a practical way. Tabulates cost data for two groups of large metal mines. 75 cents.

†B 386. Quarry Accidents in the United States During the Calendar Year 1933, by W. W. Adams and V. E. Erwin. 1935. 62 pp.

†B 387. Coal-Mine Accidents in the United States, 1933, by W. W. Adams and L. E. Geyer. 1935. 113 pp.

B 388. Manufacture of Paraffin Wax from Petroleum, by Ralph H. Espach. 1936. 113 pp., 37 figs. Gives a detailed picture of the manufacturing process employed and equipment used in production. 15 cents.

†B 389. Laboratory Studies of the Inflammability of Coal Dusts: Effect of Fineness of Coal and Inert Dusts on the Inflammability of Coal Dusts, by A. L. Godbert and H. P. Greenwald. 1936. 29 pp., 4 figs. Discusses continuation of a program of laboratory studies of the infammability of coal dust. Previous work was summarized in B 365. The purpose of the present investigation was to study the effect of variation in size of coal and inert dusts on the inflammabilities of coal dusts as determined in a laboratory apparatus and to correlate the results of these laboratory tests with those of Experimental mine tests in which similar variations were made.

†B 390. Stoping Methods and Costs, by Chas. F. Jackson and E. D. Gardner. 1936. 296 pp., 78 figs. One of a series dealing with mining methods, practices, and costs. Deals with stoping methods and costs and summarizes the data in earlier publications and those obtained during investigations in the field that apply particularly to stoping.

†B 391. Microscopic Structure and Concentratability of the More Important Iron Ores of the United States, by S. R. B. Cooke. 1936. 121 pp., 46 figs. Covers a survey of 19 ores collected from seven of the more important iron-ore districts of the United States. Is in part a general survey of iron ores with a view of collecting information concerning the nature of the minerals present and the degree and nature of the association between the economic iron minerals and the gangue minerals.

†B 392. Concentration of Copper Ores in North America, by Thomas G. Chapman. 1936. 169 pp., 26 figs. Summarizes and discusses copper-concentrator methods, results, and costs from 1929 to 1931 and includes an account of trends and developments in the industry.

†B 393. Contributions to the Data on Theoretical Metallurgy. V. Heats of Fusion of Inorganic Substances, by K. K. Kelley. 1936. 166 pp. Discusses heat-of-fusion values of inorganic substances from available freezing-point data of binary systems. The directly measured heat-of-fusion results are discussed in B 350 and 371 and several values obtained from vapor-pressure data in B 383. This bulletin discusses values derived from a wide variety of substances; they are compared, whenever possible, with results obtained by other means. (See also B 384, 394, 406, 407, and 434.)

†B 394. Contributions to the Data on Theoretical Metallurgy. VI. A Revision of the Entropies of Inorganic Substances, by K. K. Kelley. 1936. 55 pp. Supplements B 350 and 383. Gives new values now obtainable and makes revision in the older values as the data warrant. (See also B 393.)

†B 395. Occurrence, Properties, and Preparation of Limestone and Chalk for Whiting, by Hewitt Wilson and Kenneth G. Skinner. 1937. 160 pp., 48 figs. Gives the results of a study undertaken to encourage the use of domestic materials in the preparation of whiting. Describes chalk, limestone, and marble samples, by States.

†B 396. Sponge-Iron Experiments at Mococo, by Chas. G. Maier. 1937. 81 pp., 24 figs. Covers one phase of the program of the Bureau of Mines on the direct production of iron from its ores. Discusses tests with a rotary kiln to determine the possible utilization of waste iron oxide material and the potential utility of natural gas as a metallurgical reagent.

†B 397. Coal-Mine Accidents in the United States, 1934, by W. W. Adams, L. E. Geyer, and M. G. Parry. 1936. 108 pp.

†B 398. Metal-Mine Accidents in the United States, 1933–34, by W. W. Adams and M. E. Kolhos. 72 pp. 1936.

†B 399. Quarry Accidents in the United States During the Calendar Year 1934, by W. W. Adams and V. E. Wrenn, 1936. 62 pp.

†B 400. Review of Literature on Effects of Breathing Dusts, with Special Reference to Silicosis, by D. Harrington and Sara J. Davenport. 1937. 305 pp. Gives information in convenient form on effects of breathing dusts, largely in the mining and allied industries. Assembles some of the more outstanding data on several aspects of the subject, especially with reference to silicosis.

†Out of print.

Bulletins

†B 401. Properties of Typical Crude Oils from Fields of the Eastern Hemisphere, by A. J. Kraemer and E. C. Lane. 1937. 169 pp., 8 figs. Includes comments, tabulated data, and individual analyses of 142 samples of crude petroleum obtained from Albania, Czechoslovakia, France, Germany, Great Britain, Italy, Poland, Rumania, Yugoslavia, Greece, Russia, Iran, Iraq, India, Japan, East Indies, New Zealand, Algeria, Egypt, and Angola. Anayses offer means for judging relative values of foreign crude oils compared with familiar crude oils of the United States that have been analyzed by Bureau of Mines method. Bibliography lists all publications of Bureau of Mines that deal primarily with analyses of crude petroleum and contains references to methods of American Society for Testing Materials that are used in Bureau of Mines Hempel method of crude-petroleum analysis.

†B 402. Crushing and Grinding, by John Gross. 1938. 148 pp., 66 figs. Discusses theory of crushing and grinding in relationship to present-day discoveries and developments and considers various mechanical appliances from theoretical basis. Includes bibliography of other work on same subject.

†B 403. Asbestos, by Oliver Bowles. 1937. 92 pp., 10 figs. Presents a concise, world-wide, historical, technical, and economic treatment of the asbestos industry. Covers the essential features, including ocurrence, production, mining, milling, utilization, international trade, and marketing.

†B 404. Burning of Coal and Coke Treated with Small Quantities of Chemicals, by P. Nicholls, W. E. Rice, B. A. Landry, and W. T. Reid. 1937. 158 pp., 26 figs. Discusses tests to determine what effect pretreating fuels with chemicals dissolved or suspended in water has on combustion in fuel beds.

†B 405. Copper Mining in North America, by E. D. Gardner, C. H. Johnson, and B. S. Butler. 1938. 300 pp., 92 figs. Assembles and summarizes many subjects relating to copper industry in North America. Discusses production of mines and districts, history of industry, geology of principal deposits, and mining methods and costs. Lists principal copper mines of Continent, tabulates pertinent data regarding their operation, and describes practices at typical mines.

†B 406. Contributions to the Data on Theoretical Metallurgy. VII. The Thermodynamic Properties of Sulfur and Its Inorganic Compounds, by K. K. Kelley. 1937. 154 pp. Primary purpose of bulletin is correlation of thermodynamic properties of elementary sulfur and its inorganic compounds and presentation, after careful consideration of all available information, of self-consistent system of thermodynamic relationships for these substances. Bibliography covers references that were available before July 1936 to original experimental work concerning thermodynamic properties of substances considered. (See also B 350, 371, 383, 384, 393, 394, 407, and 434.)

†B 407. Contributions to the Data on Theoretical Metallurgy. VIII. The Thermodynamic Properties of Metal Carbides and Nitrides, by K. K. Kelley. 1937. 66 pp. Collects and discusses thermodynamic data relating to metal carbides and nitrides, with view of obtaining usable heat and free energy of formation relationships. First section attempts formulation of as complete a system of thermodynamic relationships as is possible; second section discusses some applications of derived relationships to problems of practical interest. (See also B 406.)

†B 408. Quarry Accidents in the United States During the Calendar Year 1935, by W. W. Adams and V. E. Wrenn. 1937. 60 pp., 8 figs.

†B 409. Coal-Mine Accidents in the United States, 1935, by W. W. Adams, L. E. Geyer, and M. G. Parry. 1938. 110 pp.

†B 410. Metal-Mine Accidents in the United States During the Calendar Year 1935, by W. W. Adams and M. E. Kolhos. 1938. 51 pp.

†B 411. Carbonizing Properties of West Virginia Coals and Blends of Coals from the Alma, Cedar Grove, Dorothy, Powellton A, Eagle, Pocahontas, and Beckley Beds, by A. C. Fieldner, J. D. Davis, W. A. Selvig, R. Thiessen, D. A. Reynolds, C. R. Holmes, and G. C. Sprunk. 1938. 162 pp., 129 figs. Another of series of papers covering survey of gas-, coke-, and byproduct-making properties of American coals being conducted by Bureau of Mines in cooperation with American Gas Association. Gives composition and carbonizing properties of seven additional coals from West Virginia. Data include results of blending tests in which Beckley low-volatile coal was used with all high-volatile coals except Alma coal, with which Pocahontas No. 4 was used.

†B 412. Composition of Coal Tar and Light Oil, by C. H. Fisher. 1938. 70 pp., 5 figs. Discusses composition of tar and light oil, which, as complex mixtures of organic compounds, are source of many important dyes, intermediates, medicinals, resins, flavoring extracts, and other products.

†B 413. Mineral Industries Survey of the United States: California, Calaveras County, Mother Lode District (South). Mines of the Southern Mother Lode Region. I. Calaveras County, by C. E. Julihn and F. W. Horton. 1938. 140 pp., 34 figs. Third in series of papers covering mineral industries survey being conducted by Bureau of Mines. Describes Mother Lode region as a whole, although concerned chiefly with Calaveras County; California gold rush of 1849 and some of its important consequences; and regional geology and ore deposition. Considers three southern Mother Lode counties together with respect to their mineral production and varied character of their mines. (See also B 424.)

†B 414. Coal Mining in Europe. A Study of Practices in Different Coal Formations and Under Various Economic and Regulatory Conditions Compared with Those in the United States, by George S. Rice and Irving Hartmann. 1939. 369 pp., 88 figs. Presents critical review of coal-mining methods used in principal producing countries of Europe, gives reasons underlying adoption of these methods, and contrasts them with coal-mining methods employed in the United States. Discusses various subjects intimately related to coal mining, such as geology of principal coal fields; production and resources of the several countries; mine safety and health research; Government mining regulations; mine inspection and rescue procedure; safety lamps; fixed lighting methods underground; testing electric motors, mining machines, and mining explosives for permissibility; and special mining hazards, such as explosions of gas and coal dust, mine fires, instantaneous gas outbursts, ground movement and surface subsidence, and bumps. Also describes briefly commercial, economic, and labor problems of European coal mining, including miners' output, wages, and social-insurance schemes, as well as cost of mining, prices of coal, etc.

†B 415. Studies of Certain Properties of Oil Shale and Shale Oil, compiled by Boyd Guthrie. 1938. 159 pp., 29 figs. Gives results of laboratory, field, and experimental plant investigations conducted by Bureau of Mines to determine oil-shale reserves of the United States and their possibilities as source of oil. Includes subject matter of published reports that are out of print, as well as more recent information not heretofore published.

†Out of print.

†B 416. Quarry Accidents in the United States During the Calendar Year 1936, by William W. Adams and Virginia E. Wrenn. 1938. 71 pp., 3 figs.

†B 417. Practices and Methods of Preventing and Treating Crude-Oil Emulsions, by G. B. Shea. 1939. 106 pp., 52 figs. Describes practical methods of preventing formation of emulsions in oil-producing operations, modern practices and methods of economically dehydrating crude-oil emulsions, and recent advances in emulsion-treating technique. Information has been gathered from field studies and augmented by review of literature.

†B 418. Petroleum and Natural-Gas Fields in Wyoming, by Ralph H. Espach and H. Dale Nichols. 1941. 185 pp., 72 figs. (With maps in box.) Prepared by Bureau of Mines in cooperation with Geological Survey, U. S. Department of the Interior, and University of Wyoming. Gives historical résumé, beginning with 1833, as background to technical descriptions and discussions of various oil fields of Wyoming. Contains data on 104 geologic structures that have been prospected, most of which are shown graphically. Individual field reports discuss geologic structures; history of development; production of oil, gas and water; production methods; and related subjects. Appendix includes 104 analyses of oils, 66 analyses of gases, and 62 analyses of water. Bibliography is classified by fields.

†B 419. Metal-Mining Practice, by Chas. F. Jackson and J. H. Hedges. 1939. 512 pp., 156 figs. Summarizes mining practices of large number of metal mines in the United States and foreign countries. Consolidates and analyzes information contained in earlier reports on mining methods, practices, and costs. Also discusses adaptation of mining methods to natural conditions in mines.

†B 420. Coal-Mine Accidents in the United States, 1936, by W. W. Adams, L. E. Geyer, and M. G. Parry. 1939. 128 pp.

†B 421. The Joseph A. Holmes Safety Association and Its Awards, by D. Harrington, Louise Pedlow, and Anna P. Brown. 1940. 121 pp., 7 figs. Reviews history, organization, and purpose of Joseph A. Holmes Safety Association and lists companies, mines, and individuals, alphabetically and numerically, that have received hero and safety awards from 1919 to 1938. Numerical lists include statements that appeared on certificates accompanying hero awards and on certificates for safety achievements. Records show definitely that safety is attainable in almost every branch of mineral industries.

B 422. Metal-Mine Accidents in the United States During the Calendar Year 1936, by W. W. Adams and M. E. Kolhos. 1939. 53 pp. 10 cents.

†B 423. Mechanical Shoveling in Underground Metal Mines, by McHenry Mosier and J. H. Steinmesch. 1940. 97 pp., 29 figs. Presents recent data on mechanical shoveling in underground metal mines and in selected nonmetal mines. Describes various mechanical shovels and discusses improved technique in loading and changes in loading practice in certain mining districts.

†B 424. Mineral Industries Survey of the United States: California, Tuolumne and Mariposa Counties, Mother Lode District (South). Mines of the Southern Mother Lode Region. II. Tuolumne and Mariposa Counties, by C. E. Julihn and F. W. Horton. 1940. 179 pp., 62 figs. Covers mines of Tuolumne and Mariposa Counties and emphasizes typical conditions to provide general view of circumstances applying to Mother Lode mining operations in counties described. (See also B 413.)

†B 425. Magnetic Separation of Ores, by R. S. Dean and C. W. Davis. 1941. 417 pp., 165 figs. Discusses briefly operations and trends in magnetic separation, explains magnetic separation, describes and classifies machines used, and outlines their development as disclosed by patents and examples of practice on wide variety of ores; it should prove useful to ore-dressing engineers and others interested in this subject.

†B 426. Quarry Accidents in the United States During the Calendar Year 1937, by William W. Adams and Virginia E. Wrenn. 1940. 73 pp., 3 figs.

†B 427. Reconnaissance of Gold Mining Districts in the Black Hills, S. Dak., by Paul T. Allsman. 1940. 146 pp., 32 figs. One of series on mineral resources of South Dakota being published by Bureau of Mines. Discusses briefly operating mines, particularly Homestake. Principal purpose of survey is to make public information not generally known concerning gold deposits in Black Hills.

†B 428. Metal-Mine Accidents in the United States During the Calendar Year 1937, by W. W. Adams and M. E. Kolhos. 1940. 54 pp.

†B 429. Fire-Retardant Treatments of Liquid-Oxygen Explosives, by A. R. T. Denues. 1940. 67 pp., 24 figs. Scope of investigation was limited to effect of fire-retardant treatments on resistance to ignition, physical characteristics, and practical hazards of handling liquid-oxygen explosive prepared from granular carbonaceous absorbent, from wrappers of triple-filled canvas, and from liquid oxygen of standard high purity. Work was done under cooperative agreement between Bureau of Mines and Pittsburgh Testing Laboratory with support of Chile Exploration Co. of New York. (See also RI 3605.)

†B 430. Coal-Mine Accidents in the United States, 1937, by W. W. Adams, L. E. Geyer, and M. G. Parry. 1940. 137 pp.

†B 431. Mechanical Concentration of Gases, by C. G. Maier. 1940. 148 pp., 11 figs. Deals with new mechanical means of attacking problem of separating constituents of mixed gas. Method described extends number of methods previously available by one that has not before been applied commercially and that utilizes well-known property of gases that never has received effective technological attention. Experiments recorded concern diffusive separation of hydrogen from heavier gases. Desire for source of pure, cheap hydrogen for certain special metallurgical purposes provided incentive for technical utilization of diffusive properties of hydrogen. Results have been related rather closely with established physical laws so as to minimize uncertainty involved in predicting results obtainable in applying method to other gases.

†B 432. Quarry Accidents in the United States During the Calendar Year 1938, by William W. Adams and Virginia E. Wrenn. 1940. 75 pp., 3 figs.

†B 433. Open-Cut Metal Mining, by E. D. Gardner and McHenry Mosier. 1941. 176 pp., 60 figs. Last of series of papers describing principal methods of mining at metal mines of the United States. Also discusses factors affecting selection of open-cut method and summarizes trends in open-cut metal mining. In this paper open-cut mining is limited to method by which ore is excavated in open pits by power equipment.

†B 434. Contributions to the Data on Theoretical Metallurgy. IX. The Entropies of Inorganic Substances. Revision (1940) of Data and Methods of Calculation, by K. K. Kelley. 1941. 115 pp. Gives available values of entropies at 298.1° K. of elements and inorganic compounds, with enough explanation of methods employed in calculating entropies to make results comprehensible. (See also B 350, 371, 383, 384, 393, 394, 406 and 407.)

†B 435. Metal-Mine Accidents in the United States During the Calendar Year 1938, by William W. Adams and Mary E. Kolhos. 1941. 52 pp.

†Out of print.

†B 436. Sponge Chromium, by C. G. Maier. 1942. 109 pp., 17 figs. Discusses theoretical and practical aspects of low-temperature gaseous reduction of chromium from its oxides and from its chlorides. Reports laboratory experiments by which high-purity sponge chromium was produced by chlorination of chromite ore, purification of chromium chloride, and hydrogen reduction of chromium from purified chloride. Results of laboratory tests indicate that process is ready for pilot-plant testing.

†B 437. Coal-Mine Accidents in the United States, 1938, by W. W. Adams, L. E. Geyer, and M. G. Parry. 1941. 127 pp.

†B 438. Quarry Accidents in the United States During the Calendar Year 1939, by William W. Adams and Virginia E. Wrenn. 1941. 76 pp., 8 figs.

B 439. Some Essential Safety Factors in Tunneling, by D. Harrington and S. H. Ash. 1941. 61 pp., 35 figs. Presents data to show what can be and is being done to prevent accidents in tunneling work. Tabulates information concerning world's longest tunnels and suggests regulations relating to control of toxic gases in shafts, tunnels, and mines other than coal mines. 30 cents.

†B 440. Metal- and Nonmetal-Mine Accidents in the United States During the Calendar Year 1939 (Excluding Coal Mines), by W. W. Adams and M. E. Kolhos. 1941. 52 pp.

†B 441. Investigations of Permissible Electric Mine Lamps, 1930–40, by L. C. Ilsley, A. B. Hooker, and W. H. Roadstrum. 1942. 50 pp., 27 figs. Presents Bureau of Mines test requirements and procedure relative to permissible electric mine lamps and describes lamps briefly, giving tabulated details of each.

B 442. Seismic Effects of Quarry Blasting, by J. R. Thoenen and S. L. Windes. 1942. 88 pp., 45 figs. At request of quarry industry Bureau of Mines undertook research to ascertain physical characteristics of seismic disturbances from blasting in quarries and to evaluate their effect on typical structures. Study is based upon data collected from records of several hundred tests conducted at 28 stone quarries in 11 Southern and Eastern States, in a limestone mine, and in 20 residential structures of various types. Paper reviews briefly previous publications, so that reader may follow progress of research, and supplies technical details supporting conclusions reached. 35 cents.

B 443. Intercrystalline Cracking of Boiler Steel and Its Prevention, by W. C. Schroeder and A. A. Berk. 1941. 85 pp., 39 figs. Summarizes results of investigation instituted by Joint Research Committee on Boiler Feed-Water Studies in cooperation with Bureau of Mines. Analyzes and interprets operating statistics from a few stationary and locomotive boilers upon basis of factors now known to be involved in cracking of this type. During study attention was devoted to understanding how cracks occur (1) to permit development of test equipment for measuring embrittling effect of boiler water and (2) to find and evaluate methods of feed-water treatment that may be used to prevent them. Several methods have been developed for preventing this difficulty that can be adapted to various types of boiler operations. 15 cents.

†B 444. Coal-Mine Accidents in the United States, 1939, by W. W. Adams, L. E. Geyer, and M. G. Parry. 1942. 123 pp.

†B 445. Plastic and Swelling Properties of Bituminous Coking Coals, by R. E. Brewer. 1942. 260 pp., 10 figs. Classifies different methods for measuring plastic and swelling properties of bituminous coking coals according to general test principle employed and summarizes virtually all published descriptions of apparatus and procedure; evaluates test data obtained by different classes of test methods and points out some of their applications in attempt to solve problems in commercial coke-oven practice; and suggests promising or desirable problems for further research. Includes comprehensive bibliography of published investigations in this field of study.

B 446. Typical Analyses of Coals of the United States, by A. C. Fieldner, W. E. Rice, and H. E. Moran. 1942. 45 pp., 1 fig. Presents summary in tabular form of composition of commercial coal resources of the United States. Gives specimen analyses exemplifying analysis of coal mined in each coal-producing county, or, where it is feasible, coal from each bed in each county; also includes ranges of analyses, within which composition of most coal represented will fall, where there were enough analyses to permit satisfactory determination of ranges. Degree of metamorphism from lignite toward anthracite of much of the coal is indicated by classification by rank. 10 cents.

†B 447. Quarry Accidents in the United States During the Calendar Year 1940, by William W. Adams and Virginia E. Wrenn. 1942. 87 pp., 3 figs.

†B 448. Coal-Mine Accidents in the United States, 1940, by W. W. Adams, L. E. Geyer, and M. G. Parry. 1942. 134 pp.

†B 449. Development and Use of Certain Flotation Reagents, by R. S. Dean and P. M. Ambrose. 1944. 89 pp., 34 figs. Discusses development and testing of a number of flotation reagents which were developed principally between 1935 and 1941, and the application of these reagents in the recovery of mineral values from ores.

†B 450. Metal- and Nonmetal-Mine Accidents in the United States During the Calendar Year 1940 (Excluding Coal Mines), by W. W. Adams and M. E. Kolhos. 1942. 51 pp.

†B 451. Syllabus of Clay Testing, Part I, by Theron A. Klinefelter, Robert G. O'Meara, Sidney Gottlieb, and Glenn C. Truesdell. 1943. 35 pp., 12 figs. Presents results of survey of more important tests recognized by various industries with a view to suggesting a series whereby any given clay may be classified according to its possible uses, both ceramic and nonceramic. Study conducted in cooperation with University of Alabama. (See also IC 7475.)

†B 452. Quarry Accidents in the United States During the Calendar Year 1941, by William W. Adams and Virginia E. Wrenn. 1943. 89 pp., 3 figs.

†B 453. Report Submited to the Trail Smelter Arbitral Tribunal, by R. S. Dean and R. E. Swain. 1944. 304 pp., 130 figs. The latest authoritative treatment of the subject of smelter-smoke damage had been described in Bureau of Mines B 96—Report of the Selby Smelter Commission. The art of protecting vegetation from the effects of smelter smoke has greatly advanced since that publication and has undoubtedly reached its highest point in the operation of the Trail Smelter, British Columbia, where smelter fumes were reaching property in the State of Washington. This report is a complete description of the smoke-control tests and policies developed at the Trail Smelter and incorporated in the regime for the operation of the smelter which was determined by the International Tribunal established for that purpose. Published in collaboration with the Meteorological Division of the Air Services Branch, Department of Transport, Canada.

†B 454. Fundamentals of Coal Sampling, by Bertrand A. Landry. 1944. 127 pp., 41 figs. Includes chapters on variability of ash content of coal; theory of random sampling; sampling characteristics of a coal whose pieces are of equal weight; sampling

†Out of print.

characteristics of a multiple-size coal; relation of variability of ash of coal pieces to their weight and to their ash content; theory of orderly sampling; and coal-sampling specifications. Also has seven appendixes—proof of random law; (std. dev.)^2 of ash percentage of increments composed of p pieces of equal weight; (std. dev.)^2 of ash percentage of increments and of pieces as a function of their weight; effect of mixing; (std. dev.)^2 of ash percentage of increments of weight W of a multiple-size coal; law of orderly sampling; and weight-weighted average weight of piece.

B 455. Anthracite Mine Fires: Their Behavior and Control, by G. S. Scott. 1944. 206 pp., 82 figs. Presents methods for determining answers to a number of specific questions presented by fires, storage, etc. In addition to information obtained during experimental work, data were taken from the work of other investigators, various handbooks, and other sources. 40 cents.

†B 456. Coal-Mine Accidents in the United States, 1941, by W. W. Adams and L. E. Geyer. 1944. 131 pp.

†B 457. Metal- and Nonmetal-Mine Accidents in the United States During the Calendar Year 1941 (Excluding Coal Mines), by W. W. Adams and F. J. Kennedy. 1944. 53 pp.

†B 458. Quarry Accidents in the United States During the Calendar Year 1942, by William W. Adams and Virginia E. Wrenn. 1944. 89 pp., 3 figs.

†B 459. Potash Salts from Texas-New Mexico Polyhalite Deposits. Commercial Possibilities, Proposed Technology, and Pertinent Salt Solution Equilibria, by John E. Conley and Everett P. Partridge. 1944. 251 pp., 62 figs. Describes experimental work in the treatment of polyhalite for the recovery of potassium salts. Includes chapters on mining, crushing, calcination and extraction of polyhalite for recovering salts, and other pertinent technical information, and a bibliography.

†B 460. Diatomites of the Pacific Northwest as Filter-Aids, by Kenneth G. Skinner, Arthur A. Dammann, Roy E. Swift, George B. Eyerly, and Gordon R. Shuck, Jr. 1944. 87 pp., 44 figs. Experiments by the Bureau of Mines, in cooperation with the University of Washington, in testing Pacific Northwest diatomites for use as filter-aids in refining sugar and other products are described. Diatomites from Washington, Oregon, northern California, and Idaho were examined.

†B 461. Metal- and Nonmetal-Mine Accidents in the United States During the Calendar Year 1942 (Excluding Coal Mines), by W. W. Adams and F. J. Kennedy. 1945. 81 pp., 19 figs.

†B 462. Coal-Mine Accidents in the United States, 1942, by W. W. Adams and L. E. Geyer. 1944. 140 pp., 1 fig.

†B 463. Operation of Electrolytic Manganese Pilot Plant, Boulder City, Nev. Part I. Pilot-Plant Operations, by J. H. Jacobs, J. W. Hunter, W. H. Yarrol, P. E. Churchward, and R. G. Knickerbocker. Part II. Methods of Analyzing Manganese Ore and Electrolytic Manganese Pilot-Plant Metallurgical Products, by R. W. Lewis, H. A. Heller, and J. H. Linck. Part III. Proposal for Electrolytic Manganese Plant for Three Kids Ore, by J. H. Jacobs, J. W. Hunter, and R. G. Knickerbocker. 1946. 169 pp., 51 figs. Describes operation of 1-ton electrolytic manganese plant from November 1941 to November 1944 at Boulder City and presents data to show effects of variables in process. Ore of various grades from Three Kids mine, Clark County, Nev., was used in all operations described. Suitable methods of analysis of ore and metallurgical products that have been adopted as standard for this particular ore and resultant products are given. An industrial plant estimate for a 10-ton- and 40-ton-per-day electrolytic manganese plant to operate on 20-percent Three Kids manganese ore is presented.

†B 464. Mineral-Dressing Characteristics of the Red Iron Ores of Birmingham, Ala., by Will H. Coghill and G. Dale Coe. 1946. 99 pp., 27 figs. Reviews several years of intensive Bureau research in methods of concentrating the red iron ores of the Birmingham area. Includes analyses, sinkfloat tests, precision batch jigging, and wet and dry crushing, grinding, scuffing, and attrition scrubbing of ore specimens. Gives tables showing results obtained by various metallurgical techniques as well as descriptions of testing procedures employed. Appendix contains numerous photomicrographs of Red Mountain iron-ore specimens.

†B 465. Production of Metallurgical Alumina From Pennsylvania Nodular Diaspore Clays, by J. E. Conley, R. A. Brown, F. J. Cservenyak, R. C. Anderberg, H. J. Kandiner, and S. J. Green. 1947. 193 pp., 68 figs. Field work by Bureau of Mines engineers has indicated that over 5,000,000 tons of high-iron diaspore clays occur in Curwensville and Morgan Run districts, Clearfield County, Pa. From 87 to 90 percent of the alumina was recovered from these clays through a Bureau sintering process using soda ash, limestone, coal, and fuel oil. Should this clay be used commercially for producing alumina, Bureau recommends a 500-ton-a-day plant on the West Branch of the Susquehanna River, just below Clearfield, Pa., and gives detailed estimates of required personnel and capital. (See also RI 4069, 4132, and 4299.)

B 466. A Guide for Reducing Fuel Consumption in Commercial Plants, by J. F. Barkley, Thos. C. Cheasley, and K. M. Waddell. 1947. 168 pp., 41 figs. Presents quiz sheets used during the war in the National Fuel Efficiency Program for instructing operators of commercial heating plants in economical use of fuels, including anthracite, bituminous coal, powdered coal, gas, and oil. Liberally illustrated with photographs and diagrams of heating apparatus. $1.

B 467. An Index of Shale-Oil Patents, Compiled by Simon Klosky. 1948. 360 pp., 338 figs. First complete listing of American and foreign patents on shale-oil products; includes all patents on record in the United States Patent Office to January 1, 1945, with illustrated short descriptions of each claim. This bulletin is in three parts—United States patents in Part I, other English language patents in Part II, and European language patents in Part III. Each part is followed by an index listing inventors and assignees alphabetically. 75 cents.

B 468. An index of Oil-Shale Patents: A compilation of United States and Foreign Patents Relating to the Mining and Retorting of Oil Shale and the Recovery of its Products, compiled by Simon Klosky. 1949. 650 pp., 595 figs. This compilation of United States and foreign patents relating to mining and retorting of oil shale and recovery of its products includes a short notice of each of the patents on oil shale available in United States Patent Office on January 1, 1945. This bulletin is in three parts—United States patents in part I, other English language patents in part II, and European language patents in part III. Each part is followed by an index, listing inventors and assignees alphabetically. $1.50.

B 469. The National Fuel Efficiency Program During the War Years 1943–45, by J. F. Barkley, Thos. C. Cheasley, and K. M. Waddell. 1949. 100 pp., 16 figs. Describes organization, personnel, methods of oper-

†Out of print.

ation, and detailed accomplishments of National Fuel Efficiency Program. 35 cents.

†B 470. Safety Practices in Dredging and Hydraulic Mining, by R. W. Fatzinger. 1946. 76 pp., 26 figs. This investigation is a continuation of a study begun with B 352 and is intended primarily as an aid to present and prospective operators. Discusses safety practices, safety devices, and safety rules and programs under the various accident headings, and lists recommendations to prevent accidents under the accident causes.

†B 471. Analyses of Complex Mixtures of Gases. Application to Control and Extinguish Fires and to Prevent Explosions in Mines, Tunnels, and Hazardous Industrial Processes, by S. H. Ash and E. W. Felegy. 1948. 202 pp., 10 figs. Describes methods for utilizing analyses of complex gas mixtures as a basis for establishing safe procedures for preventing gaseous explosions and in controlling and extinguishing fires in mines, tunnels, and industrial plants. Includes formulas and explanations, graphs, and data relating to explosibility factors applied to complex mixtures of gases consisting of carbon monoxide, methane, hydrogen, ethylene, propylene, carbon dioxide, nitrogen, and air.

B 472. Safety and Performance Characteristics of Liquid-Oxygen Explosives, by W. E. Tournay, F. M. Bower, and F. W. Brown. 1949. 88 pp., 18 figs. Presents results of an investigation made at Bureau's Explosives Testing Station, Bruceton, Pa., to develope suitable test methods for evaluating performance and sensitivity characteristics of liquid-oxygen explosives. Work done in cooperation with Linde Air Products Co., New York, N.Y. 30 cents.

B 473. Information on the Prevention of Quarry Accidents, by D. Harrington, A. W. Worcester, and J. H. East, Jr. 1950. 80 pp., 24 figs. Discusses hazards of quarrying and related industries, with methods of guarding against them, and describes and illustrates safety devices, practices, and quarrying methods. 30 cents.

B 474. Coals of Chile, by Albert L. Toenges, Leon W. Kelly, J. D. Davis, D. A. Reynolds, Thomas Fraser, W. L. Crentz, and R. F. Abernethy. 1948. 106 pp., 28 figs. Describes results of a study of coal deposits, coal-mining methods, and preparation and benefication of coals in Chile conducted by the Bureau of Mines at the request of the Chilean Government. 35 cents.

†B 475. Burning Washington Coals on Different Types of Domestic Stokers in the Same Hot-Water Boiler; Comparison With Hand and Oil Firing, by H. F. Yancey, K. A. Johnson, J. B. Cordiner, Jr., A. A. Lewis, and K. E. Lunde. 1949. 96 pp., 18 figs. Describes results of Bureau of Mines tests to determine best coals suitable for burning in three types of small stokers and comparative tests with hand-fired coal and with oil as fuel. Work done in cooperation with College of Mines, University of Washington.

B 476. Contributions to the Data on Theoretical Metallurgy. X. High-Temperature Heat-Content, Heat-Capacity, and Entropy Data for Inorganic Compounds, by K. K. Kelley. 1949. 241 pp. (Revision of B 371.) Reviews available high-temperature heat-content and specific-heat data for inorganic substances and gives tables and algebraic expressions for their representation. (See also B 350 and 477.) 65 cents.

†B 477. Contributions to the Data on Theoretical Metallurgy. XI. Entropies of Inorganic Substances. Revision (1948) on Data and Methods of Calculation, by K. K. Kelley. 1950. 147 pp. (Revision of B 434.) Gives entropy values at 298.16° K. of 800 elements and inorganic compounds, with enough explanation of methods of calculating entropies to make results comprehensible. (See also B 476.)

B 478. Review of literature on Dusts, by J. J. Forbes, Sara J. Davenport, and Genevieve G. Morgis. 1950. 333 pp. (Revision of B 400.) Describes occupational lung diseases caused by breathing silica and other dusts from mines, industrial plants, and other sources and methods of preventing the spread of these diseases through engineering, control equipment, and medical examinations; reviews recent and previously unavailable literature on dusts in mining and allied industries; and contains bibliography. 65 cents.

B 479. Iron Blast-Furnace Slag: Production, Processing, Properties, and Uses, by G. W. Josephson, F. Sillers, Jr., and D. G. Runner. 1949. 304 pp., 111 figs. Once considered a waste product of iron and steel industry, iron blast-furnace slag has been developed into useful raw material and now is widely used in road construction, for railroad ballast, as aggregate in concrete, and for other purposes. Prepared in cooperation with National Slag Association, bulletin is first comprehensive summary of information published in English language of production, processing, and uses of iron blast-furnace slag. Discusses chemical and mineralogical composition, physical properties, and specific uses of iron blast-furnace slag. $1.00.

B 480. Comparison of BM-AGA and Slot-Oven Experimental Methods of Carbonization, With Results for Eleven Coals, by J. D. Davis, D. A. Reynolds, D. E. Wolfson, and G. W. Birge. 1950. 37 pp., 19 figs. Describes experiments testing coke-making qualities of 3 high-volatile coals and 8 blends of coals differing in rank, using both standard BM-AGA and slot-oven methods. 20 cents.

B 481. Safety in the Mining Industry, by D. Harrington, J. H. East, Jr., and R. G. Warncke. 1950. 102 pp., 29 figs. Djscusses various causes of fatal and nonfatal accidents in mines and quarries, with known preventive measures, cites outstanding safety records achieved by individual mines, and shows progress industry has made in improving mine safety. Originally issued as IC 7485. 50 cents.

B 482. American Lignites: Geological Occurrence, Petrographic Composition, and Extractable Waxes, by W. A. Selvig, W. H. Ode, B. C. Perks, and H. J. O'Donnell. 1950. 63 pp., 22 figs. Discusses geological occurrence and petrographic composition of American lignites and describes results of an investigation to determine probable yields of wax from domestic lignite and properties of extracted waxes. 35 cents.

†B 483. High-Sulfur Pittsburgh Coal: Upgrading in Southwestern Pennsylvania and Northern West Virginia, by Thomas Fraser, W. L. Crents, and A. L. Bailey. 1950. 70 pp., 10 figs. 56 data sheets. Deals with upgrading to metallurgical standards of large reserves of high-sulfur Pittsburgh coal remaining in southwestern Pennsylvania and northern West Virginia.

B 484. Helium: Bibliography of Technical and Scientific Literature From Its Discovery (1868) to January 1, 1947, by Henry P. Wheeler, Jr., and Louise B. Swenarton. 1952. 76 pp. Contains references to all technical and scientific articles pertaining to helium that are known by Bureau of Mines scientists to have been published before January 1, 1947, and includes many references to articles containing information on helium that have appeared in medical journals and some popular magazines. 35 cents.

†B 485. Bibliography of Pressure Hydrogenation. I. Review and Compilation of the Literature on Pressure Hydrogenation of Liquid and Solid Carbonaceous Materials, by J. L. Wiley and H. C. Anderson. 1950. 306 pp. This review, first of three parts, con-

†Out of print.

tains 2,503 digests of literature dealing with hydrogenation, one of the processes of converting coal into oil.

B 485. Bibliography of Pressure Hydrogenation. II. Patents, by J. L. Wiley and H. C. Anderson. 1951. 286 pp. The second of three parts, bulletin reviews 3,569 domestic and foreign patents dealing with pressure hydrogenation. $1.00.

B 485. Bibliography of Pressure Hydrogenation. III. Subject Index; Numerical Patent Index, by J. L. Wiley and H. C. Anderson. 1952. 54 pp. The third of three parts, bulletin contains a detailed subject index of the abstracts of technical literature on hydrogenation given in part I and of the domestic and foreign patents dealing with pressure hydrogenation contained in part II. A numerical patent list by countries is included. 25 cents.

†B 486. Helium-Bearing Natural Gases of the United States. Analyses and Analytical Methods, by C. C. Anderson and H. H. Hinson. 1951. 141 pp., 8 figs. Presents analyses on more than 2,100 samples of natural gases from 30 States, representing Bureau of Mines surveys for helium-bearing gases made over the past 33 years. Sketches briefly historical background of helium survey and describes methods of collecting gas samples and analyzing them. (See also B 576.)

B 487. Characterization of Tar Acids From Coal-Hydrogenation Oils, by E. O. Woolfolk, C. Golumbic, R. A. Friedel, Milton Orchin, and H. H. Storch. 1950. 56 pp., 31 figs. Contains basic information on separation and identification of industrial compounds produced in hyrogenation of coal—a method of making gasoline from coal. Includes interpretative data on physical and chemical properties of tar acids, discussion of experimental techniques, isolation and identification of individual phenols, and data on higher boiling tar acids. 35 cents.

B 488. The Isosynthesis, by Helmut Pichler and Karl-Heinz Ziesecke, translated by R. Brinkley; technical revision by N. Golumbic. 1950. 39 pp., 19 figs. Translation of German manuscript describing an investigation of the synthesis of branched-chain hydrocarbons that was carried out in laboratories of Kaiser Wilhelm Institute for Coal Research. Contains data on development of the catalyst for the isosynthesis, on effect of temperature and pressure of operation, and on composition of the products of the reaction. Discusses experimental evidence and speculations concerning mechanism of the isosynthesis. 25 cents.

†B 489. Proceedings: Fifth International Conference of Directors of Mine Safety Research, compiled by H. P. Greenwald. 1950. 223 pp., 100 figs. Comprises papers delivered at Fifth International Conference of directors of mine safety research held at Pittsburgh, Pa., in September 1948. Representatives from Belgium, France, Germany, Great Britain, and Poland were present. Papers presented and discussions dealt with various safety problems involved in mining coal and presented solutions for improvement in safety conditions.

†B 490. The Bureau of Mines Routine Method for the Analysis of Crude Petroleum. I. The Analytical Method, by N. A. C. Smith, H. M. Smith, O. C. Blade, and E. L. Garton. 1951. 82 pp., 20 figs. (Revision of B 207.) Describes equipment and procedures used in Bureau of Mines routine method of making crude-oil analyses; discusses distillation, sampling and sample handling, determination of properties, and preparing report of an analysis; and includes outline showing procedure to be followed, step by step, with paragraph references to detailed discussions earlier in the publication. (See also IC 7921.)

†Out of print.

B 491. Inundated Anthracite Reserves: Eastern Middle Field of Pennsylvania, by S. H. Ash, H. D. Kynor, R. W. Fatzinger, B. S. Davies, and J. C. Gilbert. 1950. 28 pp., 14 figs. Contains estimated anthracite reserve tonnage in the Eastern Middle field, method of study to determine tonnage in pools, anthracite inundated by water, present methods of handling water in the field, and proposed methods of unwatering pools containing anthracite. 15 cents.

B 492. Methods of Analyzing Coal and Coke, by A. C. Fieldner and W. A. Selvig. 1951. 51 pp., 24 figs. This paper, first published in 1912 as TP 8, was revised and enlarged in 1913, 1926, 1929, and 1939 to incorporate various improvements and modifications in laboratory procedures that had been made in the existing methods as well as a number of new methods. Includes changes in the determination of carbon and hydrogen by means of an electrically heated combustion furnace as given in the 1939 edition, methods for determining agglutinating value of coal and free-swelling index of coal, and tumbler test for coke. 50 cents.

B 493. Carbonizing Properties: West Virginia Coals From the Eagle, No. 2 Gas, Pocahontas No. 3, and Pocahontas No. 4 Beds, by J. D. Davis, D. A. Reynolds, R. E. Brewer, W. H. Ode, B. W. Naugle, D. E. Wolfson, and G. W. Birge. 1950. 39 pp., 24 figs. Carbonization studies on four West Virginia coals show that these fuels are suitable for manufacture of oven coke if blended in the proper proportions. 30 cents.

B 494. Buried Valley of the Susquehanna River, Anthracite Region of Pennsylvania, by S. H. Ash. 1950. 27 pp., 35 figs. (With maps in box.) As part of its broad study of the mine-water problem in the Pennsylvania anthracite region, Bureau of Mines has been investigating the buried valley of the Susquehanna River for many years. Based upon records of more than 12,000 boreholes, bulletin gives data on depth and configuration of the water-bearing formations and thickness of the rock between them and the anthracite beds. Includes contour maps and cross sections covering entire rock surface underlying the buried valley. $7.50.

B 495. Preparation Characteristics of Some Coals Available for the Synthetic Liquid Fuels Industry, by Thomas Fraser, William L. Crentz, and Orrin T. Barrett. 1950. 132 pp., 92 figs. Describes results of sampling and testing a series of typical American coals deemed to be suitable for hydrogenation. Purpose of tests was to determine responsiveness of these coals to preparatory treatment. 50 cents.

B 496. Carbonizing Properties: Pocahontas No. 6, Davy Sewell, and Fire Creek Coals From West Virginia and Upper and Lower Kittanning and Upper and Lower Freeport Coals From Pennsylvania, by J. D. Davis, D. A. Reynolds, R. E. Brewer, D. E. Wolfson, B. W. Naugle, and G. W. Birge. 1950. 42 pp., 27 figs. Gives results of a study of carbonizing properties of seven American coals by a standard method known as the BM–AGA carbonization test. Use of this method permits comparison of results on different coals. 30 cents.

B 497. Aviation Gasoline and Its Component Hydrocarbons: Wartime Research (1940–45), by H. M. Smith, A. J. Kraemer, and H. M. Thorne. 1951. 79 pp., 32 figs. Describes the aviation gasoline program, the most important phase of Bureau's studies on petroleum chemistry and refining between 1940 and 1945, and equipment and procedures employed and contains evaluations of test data and graphs showing fractional analyses of naphtha from crude oil samples from California, Louisiana, New Mexico, Texas, and Wyoming. $1.50.

†B 498. Lurgi Process: Use for Complete Gasification of Coals With Steam and Oxygen Under Pressure,

by J. Cooperman, J. D. Davis, W. Seymour, and W. L. Ruckes. 1951. 38 pp., 18 figs. Gives results of an investigation of the possibilities of gasifying Alabama coals by the Lurgi process. This process, developed by the Lurgi company in Germany, completely gasifies carbonaceous materials under pressure, using oxygen and steam as the gasifying agents.

B 499. Analyses of Ohio Coals, by A. C. Fieldner, Dorothy Ann Taylor, Albert L. Toenges, William L. Crentz, Thomas Fraser, W. H. Young, R. L. Anderson, N. H. Snyder, H. M. Cooper, R. F. Abernethy, and F. E. Hartner. 1952. 93 pp., 5 figs. (Revision of TP 344.) Presents principal facts regarding reserves, characteristics, production, and uses. 50 cents.

B 500. Carbonizing Properties: Chilton Coal From Lorado No. 5 Mine, Lorado, Logan County, W.Va. by J. D. Davis, D. A. Reynolds, D. E. Wolfson, W. H. Ode, and B. W. Naugle. 1951. 26 pp., 19 figs. Gives results of a study of carbonizing properties of Chilton-bed coal by a standard method known as the BM–AGA carbonization test. Use of this method permits comparison of results on different coals. 25 cents.

B 501. Coal Deposit, Coal Creek District, Gunnison County, Colo.: Reserves, Coking Properties, and Petrographic and Chemical Characteristics, by Albert L. Toenges, Louis A. Turnbull, J. D. Davis, D. A. Reynolds, B. C. Parks, H. M. Cooper, and R. F. Abernethy. 1952. 83 pp., 23 figs. (Supplements RI 4104.) Describes an investigation by diamond drilling conducted in the Coal Creek district to determine the reserves of coal in this area and the coking properties of these coals. 50 cents.

B 502. Lignite in Greece, by Albert L. Toenges, W. L. Crentz, B. C. Parks, and R. F. Abernethy. 1951. 57 pp., 36 figs. Gives results of an investigation made at the request of the Economic Cooperation Administration of certain lignite areas in Greece. Describes mining practices in Greek lignite mines and gives washing characteristics and petrographic analysis of lignites in Greece. 45 cents.

B 503. Limits of Flammability of Gases and Vapors, by H. F. Coward and G. W. Jones. 1952. 155 pp., 63 figs. (Revision of B 279.) Issued as a result of a cooperative study begun in 1924 between Safety in Mines Research Board of Great Britain and Bureau of Mines, bulletin contains the most comprehensive listing of the limits of flammability of gases and vapors in air or oxygen yet made available in a single volume; explains how flammability limits are determined and some of the theoretical considerations taken into account in such experimentation; and presents results of a critical review of all figures published on the limits of flammability of combustible gases and vapors when mixed with air, oxygen, or other "atmosphere." 70 cents.

†B 504. Fluid Flow Through Packed and Fluidized Systems, by M. Leva, M. Weintraub, M. Grummer, M. Pollchik, and H. H. Storch. 1951. 149 pp., 99 figs. This study was begun in 1946 to develop correlations that would be suitable for the design of new equipment in which fluids are brought into contact with granular materials. To arrive at general relationships, systems were chosen that did not involve chemical reactions, and a particular effort was made to give the correlations only in terms of quantities that are ordinarily available from general process and design specifications.

B 505. Studies of the Extraction and Coking of Coal and Their Significance in Relation to Its Structure, by M. Orchin, C. Golumbic, J. E. Anderson, and H. H. Storch. 1951. 15 pp., 5 figs. Studies deal with dispersion of coal in solvents at high temperature and with carbonization of coal to coke. An extraction technique was developed that may have a commercial application in the preparation of low-ash carbonaceous material for the manufacture of electrode carbon. 20 cents.

B 506. Carbonizing Properties: West Virginia Coals From the Pittsburgh Bed, Jamison No. 9 Mine, Marion County, and Upper Freeport Bed, Bull Run No. 1 Mine, Preston County, by J. D. Davis, D. A. Reynolds, R. E. Brewer, D. E. Wolfson, B. W. Naugle, and G. W. Birge. 1952. 31 pp., 19 figs. Gives results of an investigation of the carbonizing properties of two West Virginia coals by a standard method known as the BM-AGA carbonization test. 35 cents.

B 507. Castleman Basin, Garrett County, Md. Coal Beds in Central Part; Reserves; Petrographic and Chemical Characteristics of Coals; Stratigraphy of Area, by Albert L. Toenges, Lloyd Williams, Louis A. Turnbull, B. C. Parks, H. J. O'Donnell, Roy F. Abernethy, William H. Ode, and Karl Waage. 1952. 122 pp., 19 figs. (With maps in box.) Describes an investigation of the coal beds in the Castleman Basin by diamond drilling, engineering examination, and geologic study. $4.50.

B 508. Acid-Mine-Drainage Problems, Anthracite Region of Pennsylvania, by S. H. Ash, E. W. Felegy, D. O. Kennedy, and P. S. Miller. 1951. 72 pp., 11 figs. Describes nature and extent of stream pollution caused by mine drainage in the anthracite region of Pennsylvania, with remedial measures, and methods of water treatment and of acid disposal. Contains chemical analyses of surface water in the United States and of streams in the anthracite-region drainage basins. 60 cents.

B 509. Injury Experience in Coal Mining, 1948: Detailed Analysis of Factors Influencing Mine Safety and Related Employment, Production, and Productivity Data, by Forrest T. Moyer, G. D. Jones, and V. E. Wrenn. 1952. 109 pp. Presents data on fatal and nonfatal injuries in bituminous-coal and Pennsylvania anthracite mines for 1948, historical data on coal-mine fatality rates for the United States during 1870–1948, injury, employment, production, and productivity data by States during 1930–48, and a list of the Nation's major coal-mine disasters and number of men killed from 1910 to 1948. 45 cents.

B 510. Carbonizing Properties: British Columbia, Matanuska Valley (Alaska), and Washington Coals and Blends of Six of Them With Lower Sunnyside (Utah) Coals, by J. D. Davis, D. A. Reynolds, R. E. Brewer, B. W. Naugle, D. E. Wolfson, F. H. Gibson, and G. W. Birge. 1952. 42 pp., 22 figs. Gives results of an investigation of the carbonizing properties of 18 coals from Alaska, British Columbia, Washington, and Utah to determine their suitability for making metallurgical coke. 40 cents.

B 511. Carbonizing Properties: Eastern Kentucky Coals From Elkhorn No. 1, Elkhorn No. 2, Leatherwood, and Harlan Beds, by J. D. Davis, D. A. Reynolds, R. E. Brewer, D. E. Wolfson, B. W. Naugle, W. H. Frederic, and G. W. Birge. 1952. 33 pp., 21 figs. Gives results of an investigation of the carbonizing properties of four Kentucky coals by BM-AGA carbonization tests and by expansion tests. 25 cents.

B 512. Analyses of Foreign Coals, by R. E. Morgan and J. F. Barkley. 1952. 34 pp., 6 maps. Contains analyses of foreign coals, world production of coal and lignite, and world resources of coal, brown coal, and lignite. 30 cents.

B 513. Core Drilling at Shaft Sites of Proposed Mine-Water Drainage Tunnel, Anthracite Region of Pennsylvania, by S. H. Ash, R. Emmet Doherty,

†Out of print.

P. S. Miller, W. M. Romischer, and J. D. Smith. 1952. 43 pp., 48 figs. Describes the sites of 15 holes diamond-drilled along the line of a proposed main drainage tunnel as part of a comprehensive engineering survey of the mine-water problem in the anthracite area of Pennsylvania and drilling equipment used; discusses character of the geologic formations along the tunnel route and advantages of tunneling. 30 cents.

B 514. American Standard Safety Code for Installing and Using Electrical Equipment In and About Coal Mines (M2.1) (Revision of American Standard Safety Rules for Installing and Using Electrical Equipment in Coal Mines, M2–1926): American Standards Association, sponsored by American Mining Congress and Bureau of Mines. 1952. 28 pp., 8 figs. (Revision of TP 402.) Contains the American Standards Association's safety code for installing and using electrical equipment in and about coal mines, including requirements designed to minimize hazards resulting from the use of electrically operated equipment introduced into coal-mine practice in recent years. 20 cents.

B 515. Coal Deposits in the Deep River Field, Chatham, Lee, and Moore Counties, N.C.: Reserves; Petrographic and Chemical Characteristics, by Albert L. Toenges, Louis A. Turnbull, Joseph J. Shields, Wilbur A. Haley, B. C. Parks, and R. F. Abernethy. 1952. 41 pp., 10 figs. Gives results of an investigation of coal deposits in the Deep River field by diamond drilling undertaken by the Bureau at the request of North Carolina officials to determine thickness and continuity of the coal beds, physical conditions in and surrounding the beds that would influence future mining, and petrographic and chemical characteristics of the coals. Known reserves in the Deep River coal field are estimated at 87,548,000 tons of high-volatile A bituminous, 50 percent of which is recoverable by present mining methods. 75 cents.

B 516. Analyses of Tipple and Delivered Samples of Coal (Collected During the Fiscal Years 1948 to 1950, Inclusive), by N. H. Snyder and S. J. Aresco. 1953. 133 pp. First of a new series, bulletin gives analytical data showing composition and quality of tipple and delivered samples of coal collected from July 1, 1947, to June 30, 1950. 55 cents.

B 517. Barrier Pillars in Lackawanna Basin, Northern Field, Anthracite Region of Pennsylvania, by S. H. Ash, B. S. Davies, H. E. Jenkins, and W. M. Romischer. 1952. 114 pp., 6 figs. Bulletin furnishes data on barrier pillars that enter into the water problem of the Lackawanna Basin of the Pennsylvania anthracite region and is designed to help solve the anthracite-mine-water problem of the Northern field. Ninety-three barrier pillars were investigated by the Bureau. (See also B 521, 526, and 538.) $1.00.

B 518. Surface-Water Seepage Into Anthracite Mines in the Lackawanna Basin, Northern Field, Anthracite Region of Pennsylvania, by S. H. Ash, W. L. Eaton, and R. H. Whaite. 1952. 37 pp., 25 figs. Discusses the nature of stream-bed and surface seepage problems; mentions remedial measures devised by some anthracite-mining companies to prevent seepage of surface water into their mines; and summarizes the engineering study, conducted during 1950 by the Bureau, on seepage of surface water into mine workings underlying the Lackawanna River drainage area. (See also B 532 and 534.) 75 cents.

†B 519. Sponge Iron and Direct-Iron Processes, by Edward P. Barrett. 1954. 143 pp., 32 figs. Reviews Bureau of Mines research on sponge iron and describes processes used or proposed in this country, Sweden, and Germany. Includes bibliography and list of United States patents for production processes.

†B 520. Static Electricity in Hospital Operating Suites: Direct and Related Hazards and Pertinent Remedies, by P. G. Guest, V.W. Sikora, and Bernard Lewis. 1953. 58 pp., 15 figs. First published as RI 4833, bulletin shows prevalence of static electricity in the average hospital anesthetizing area and the degree to which it constitutes an explosion hazard. Based upon research at 14 hospitals, paper describes conditions found and suggests corrective measures.

B 521. Barrier pillars in the Western Middle Field, Anthracite Region of Pennsylvania, by S. H. Ash, D. O. Kennedy, H. B. Link, and W. M. Romischer. 1953. 92 pp., 9 figs. Gives data on barrier pillars in the Western Middle field of the Pennsylvania anthracite region that will be helpful in solving the anthracite-mine-water problem of that field. Eighty barrier pillars were investigated by the Bureau. (See also B 517.) $1.00.

B 522. Carbonizing Properties: West Virginia Coals From the Beckley Bed, Caretta No. 5 Mine, McDowell County, and Glen Rogers No. 2 Mine, Wyoming County, by D. A. Reynolds, J. D. Davis, D. E. Wolfson, B. W. Naugle, R. E. Brewer, G. W. Birge, and W. H. Frederic. 1953. 27 pp., 13 figs. Gives results of an investigation of the composition and carbonizing properties of two West Virginia coals. 20 cents.

B 523. Carbonizing Properties: Tennessee Coals From the Jellico Bed in Campbell County and the Sewanee Bed in Marion County, by D. A. Reynolds, J. D. Davis, G. W. Birge, R. E. Brewer, D. E. Wolfson, W. H. Ode, and B. W. Naugle. 1953. 35 pp., 19 figs. Gives results of an investigation of the carbonizing properties of two Tennessee coals by a standard method known as the BM-AGA carbonizing test. Use of this method permits comparison of results on different coals. 35 cents.

B 524. Visual-Arc Spectroscopic Analysis, by Maurice J. Peterson and Howard W. Jaffe. 1953. 20 pp., 4 figs. The visual-arc spectroscopic method of analysis can be used advantageously for the qualitative identification of most metallic elements, according to this bulletin presenting information contained in three papers that have been published on visual-arc spectroscopic analysis of mineral samples, with some additional data. 75 cents.

B 525. Injury Experience in Coal Mining, 1949: Detailed Analysis of Factors Influencing Mine Safety and Related Employment, Production, and Productivity Data, by Seth T. Reese, Virginia E. Wrenn, and Elizabeth J. Reid. 1953. 131 pp. Presents data on fatal and nonfatal injuries in bituminous-coal and Pennsylvania anthracite mines for 1949 and in bituminous-coal and anthracite mines by States for 1943 to 1947. Also gives injury, employment, production, and productivity data at coal mines for 1949 and by States for 1943 to 1947. 60 cents.

B 526. Barrier Pillars in the Southern Field, Anthracite Region of Pennsylvania, S. H. Ash and H. D. Kynor. 1953. 44 pp., 26 figs. Gives factual data on barrier pillars that will help to solve the anthracite-mine-water problem of the Southern field in Pennsylvania. Thirty-five barrier pillars were investigated by the Bureau. (See also B517.) $1.00.

B 527. Injury Experience in the Coking Industry, 1951, by Seth T. Reese, Naomi W. Kearney, and Elizabeth A. Miller. 1954. 26 pp. Gives injury records for the coking industry of the United States, including injury experience at beehive and by-product coke ovens by States for 1951 and injury record at coke ovens for 1916–51. 25 cents.

†Out of print.

B 528. Bibliography of Bureau of Mines Investigations of Coal and Its Products, 1945 to 1950, by E. P. Carman, M. Opperman, S. Nishiyama, and L. Racoosin. 1954. 60 pp. (Supplements TP 576, 639, and 698.) Lists more than 800 reports by members of the Bureau (including those published by the Bureau, by journals of various societies, and by the technical and trade press). Contains index by subjects and authors. (See also IC 7825.) 40 cents.

†B 529. Multiphase-Flow Theory and the Problem of Spacing Oil Wells, by Frank G. Miller. 1954. 35 pp., 12 figs. Report is primarily an exposition of the scientific and engineering principles that would underlie any theoretical solution to the well-spacing problem.

B 530. Low-Temperature Carbonization Assay of Coal in a Precision Laboratory Apparatus, by John B. Goodman, Manuel Gomez, V. F. Parry, and W. S. Landers. 1953. 24 pp., 7 figs. Describes a low-temperature carbonization assay test for use on coal and the apparatus employed and presents factual data derived from this test. 55 cents.

B 531. Mine Pumping Plants, Anthracite Region of Pennsylvania, by S. H. Ash, C. S. Hower, D. O. Kennedy, and W. H. Lesser. 1953. 151 pp., 20 figs. Presents results of a study of pumping plants in the anthracite mines, covering removal of the water from the mines for the period 1944–51, and summarizes data on the volume and quality of anthracite mine water. $1.00.

B 532. Surface-Water Seepage Into Anthracite Mines in the Western Middle Field, Anthracite Region of Pennsylvania, by S. H. Ash and H. B. Link. 1953. 26 pp., 12 figs. Summarizes engineering study conducted during 1952 by Bureau on seepage of surface water into mine workings underlying the Western Middle field drainage area. (See also B 518.) 40 cents.

B 533. Thermal Solution and Hydrogenation of Green River Oil Shale: Experimental Investigations and Bibliography, by H. B. Jensen, W. I. Barnet, and W. I. R. Murphy. 1953. 42 pp., 7 figs. The thermal-solution process and a modification of it, wherein the conversion of a higher percentage of the organic matter in oil shale to volatile products by heating the shale either alone or in the presence of a solvent and extracting the soluble conversion products rather than distilling them from the shale is carried out under a high partial pressure of hydrogen, have been studied at the Petroleum and Oil-Shale Experiment Station, Laramie, Wyo., to determine their applicability to Green River oil shale. Results of this work are presented. 30 cents.

B 534. Surface-Water Seepage Into Anthracite Mines in the Wyoming Basin, Northern Field, Anthracite Region of Pennsylvania, by S. H. Ash and R. H. Whaite. 1953. 30 pp., 15 figs. Summarizes engineering study conducted during 1950 and 1952 by Bureau on seepage of surface water into mine workings in the Wyoming Basin of the Northern field. Fifty-nine streams overlying the Wyoming Basin were investigated. (See also B 518.) 55 cents.

B 535. Coal-Mine Bumps: Some Aspects of Occurrence, Cause, and Control, by Charles T. Holland and Edward Thomas. 1954. 37 pp., 39 figs. Bumps in coal mines result in serious accidents involving loss of life and extensive damage to mining properties, according to this bulletin giving the causes of bumps and methods of preventing them. Purpose of report is to analyze the coal-mine bumps that have occurred on pillar lines during past 25 years to aid mining engineers and other mine officials in improving mine layouts and face mining methods in mines where bumps may be expected to occur. 35 cents.

B 536. Carbonizing Properties of American Coals: Index of Coals Tested by the Bureau of Mines, by R. L. Brown, J. D. Davis, D. A. Reynolds, and F. W. Smith. 1954. 17 pp. Contains tables listing American coals that have been studied in carbonization-section laboratories of Bureau for carbonizing properties and yields of coke and coal chemicals. These coals have been carbonized by Bureau in the 13- and/or 18-inch BM-AGA retorts. 20 cents.

B 537. Air Pollution. A Bibliography, by S. J. Davenport and G. G. Morgis. 1954. 448 pp. Scientific literature, published from 1819 to 1952, on outdoor air pollution is summarized in this bibliography, prepared at the request of the chairman of the United States Technical Conference on Air Pollution, held at Washington, D.C., in May 1950, and compiled from foreign and domestic sources by the Bureau. Contains 3,902 references and an author index. $1.75.

B 538. Barrier Pillars in Wyoming Basin, Northern Field, Anthracite Region of Pennsylvania, by S. H. Ash. 1954. 251 pp., 8 figs. Gives factual data on barrier pillars that will help to solve the anthracite-mine-water problem of the Northern field. Two hundred and twenty-four barrier pillars were investigated. (See also B 517.) $1.75.

B 539. Surface-Water Seepage Into Anthracite Mines in the Southern Field, Anthracite Region of Pennsylvania, by S. H. Ash, H. B. Link, and W. M. Romischer. 1954. 52 pp., 49 figs. Summarizes engineering study conducted during 1953 by Bureau on seepage of surface water into mine workings underlying the Southern field drainage area. Forty-nine streams were examined. $1.00.

B 540. Injury Experience in Coal Mining, 1950. Analysis of Mine Safety Factors, Related Employment, and Production Data, by Seth T. Reese, Virginia E. Wrenn, and Elizabeth J. Reid. 1954. 64 pp. Presents data on fatal and nonfatal injuries in bituminous-coal and Pennsylvania anthracite mines for 1950 and by States for 1950. Also gives injury experience, employment, and production data for the year. 40 cents.

B 541. Explosion-Proof Design and Wiring for Permissible Mining Equipment, by E. J. Gleim, R. S. James, and H. B. Brunot. 1955. 40 pp., 28 figs. (Revision, in part, of B 258.) Discusses mainly design features of explosion-proof units employed in the construction of permissible machines. 50 cents.

†B 542. Contributions to the Data on Theoretical Metallurgy. XII. Heats and Free Energies of Formation of Inorganic Oxides, by James P. Coughlin. 1954. 80 pp. Collects and compiles, in readily usable form, heat and free-energy-of-formation data for inorganic oxides. Such data are used in evaluating heat balances in metallurgical processes, in appraising possible improvements in existing metal extractive methods, and as a guide in the search for better methods of producing metals of recent or possible future commercial interest. (See also B 350.)

B 543. Permissible Mine Equipment Approved to January 1, 1953, With Appended List of Available Flame-Lamp Fuels and Manufacturers of Flame-Resistant Trailing Cables, by H. B. Brunot. 1954. 33 pp. Lists permissible mine equipment, tested and approved by the Bureau, giving approval dates and names of manufacturers. This list, complete to January 1, 1953, supersedes all previous lists of such equipment that have been published in the past as information circulars. Included are appendixes listing obsolete equipment still in use, but for which repair parts are not currently available; list-

†Out of print.

ing seven satisfactory fuels available for use in permissible flame safety lamps and showing where the fuels are available; and listing manufacturers of flame-resistant trailing cables, with the identifying symbols assigned by the Bureau for marking these cables. (See also IC 7722 and 7840.) 25 cents.

B 544. Bibliography of the Fischer-Tropsch Synthesis and Related Processes (in Two Parts). I. Review and Compilation of the Literature on the Production of Synthetic Liquid Fuels and Chemicals by the Hydrogenation of Carbon Monoxide, by H. C. Anderson, J. L. Wiley, and A. Newell. 1954. 532 pp. This review, first of two parts, contains 3,771 abstracts of the technical literature and patents dealing with the history, development, and commercial application of the Fischer-Tropsch synthesis and related processes for the hydrogenation of carbon monoxide and the production of synthetic fuels and chemicals, with a comprehensive subject index. Part II includes a numerical patent list by countries. $2.25.

B 544. Bibliography of the Fischer-Tropsch Synthesis and Related Processes (in Two Parts). II. Patents, by H. C. Anderson, J. L. Wiley, and A. Newell. 1955. 965 pp. The second of two parts, bulletin reviews 4,017 domestic and foreign patents concerning the Fischer-Tropsch synthesis and related processes for the hydrogenation of carbon monoxide and the production of synthetic fuels and chemicals. Includes numerical patent list by countries and a comprehensive subject index. Part I contains abstracts of the technical literature. $1.75.

B 545. Flood Prevention in Anthracite Mines, Northern Field, Anthracite Region of Pennsylvania, Project No. 1 (Lackawanna), by S. H. Ash, H. A. Dierks, H. D. Kynor, W. H. Lesser, P. S. Miller, and W. M. Romischer. 1954. 61 pp., 31 figs. One of a series on a proposed tunnel system for draining all the mines in the anthracite region, bulletin discusses feasibility of driving a tunnel 11.89 miles long, with a pumping plant, to drain the water from the mines in the Lackawanna Basin of the Northern field and to remove the threat of this water flowing into the Wyoming Basin of the same field. Included are economic development of the Northern field and improvement desired, geology and hydrology of the field, and basic problem, plans, and costs of Project No. 1 (Lackawanna). (See also B 546, 547, 560, and 562.) $1.00.

B 546. Flood Prevention in Anthracite Mines, Western Middle and Southern Fields, Anthracite Region of Pennsylvania, Project No. 2, by S. H. Ash, H. A. Dierks, H. D. Kynor, W. H. Lesser, P. S. Miller, and W. M. Romischer. 1955. 37 pp., 35 figs. Second of a series on a proposed tunnel system for draining all mines in the anthracite region, bulletin outlines construction work contemplated under the project. Includes economic development of Western Middle and Southern fields, geology and hydrology of the fields, and basic problem, plans, and costs of the project. (See also B 545.) $1.75.

B 547. Flood Prevention in Anthracite mines, Northern Field, Anthracite Region of Pennsylvania, Project No. 3 (Wyoming), by S. H. Ash, H. A. Dierks, H. D. Kynor, W. H. Lesser, P. S. Miller, and W. M. Romischer. 1955. 35 pp., 28 figs. Third of a series on a proposed tunnel system for draining all mines in the anthracite region, bulletin outlines work constituting the project. Includes economic discussion of area affected, geology and hydrology of Northern field, and basic problem, plans, and costs of the project. (See also B 545.) $1.00.

B 548. Injury Experience in the Coking Industry, 1952. Detailed Analyses of Safety Factors and Related Employment Data, by Seth T. Reese and Naomi W. Kearney. 1955. 20 pp. Presents injury data and experience at beehive and byproduct coke ovens by States for 1952 and injury record at coke ovens for 1916–52. 20 cents.

B 549. Injury Experience in Coal Mining. 1951. Analysis of Mine Safety Factors, Related Employment, and Production Data, by Seth T. Reese, Virginia E. Wrenn, and Elizabeth J. Reid. 1955. 73 pp. Presents data on fatal and nonfatal injuries in bituminous-coal and Pennsylvania anthracite mines for 1951, historical data on coal-mine fatality rates for the United States during 1870–1951, and injury, employment, production, and productivity data by States during 1930–51. 40 cents.

B 550. Petrography of American Coals, by B. C. Parks and H. J. O'Donnell. 1957. 193 pp., 40 figs. Presents all the Bureau's petrographic and associated information on American coals, including chemical analyses of 217 samples obtained from mines and exploratory drill holes, results of incidental tests and determinations, and geological and mine information on source of samples. Explains Bureau's system of describing and classifying coals by type on the basis of microscopic examination of thin samples. This comprehensive report should prove valuable to scientists, engineers, educators, and others interested in the origin, composition, and utilization of coal. $1.75.

B 551. A Graphic Method of Determining the Explosibility Characteristics of Mine-Fire Atmospheres, by J. F. Shaw. 1955. 11 pp., 6 figs. Discusses briefly analyses of complex mixtures of gases encountered in mines, illustrates application of such data in fire-fighting procedures, and presents charts to determine if a given gas is explosive or capable of forming an explosive mixture when air is added. $1.00.

B 552. The Asbestos Industry, by Oliver Bowles. 1955. 122 pp., 15 figs. (Revision of B 403.) Presents up-to-date information on a mineral commodity of unusual interest, covering origin, history, utilization, production, reserves, international trade, mining, milling, marketing, and beneficiation of the commodity and the manufacture of asbestos products. $1.00.

B 553. Injury Experience in the Coking Industry, 1953. Detailed Analysis of Safety Factors and Related Employment Data, by Seth T. Reese and Naomi W. Kearney. 1955. 18 pp. Presents statistical data on fatal and nonfatal injuries at beehive and byproduct coke ovens by States and by causes for the year and facts on injuries and employment at all coke ovens for 1916–52. 15 cents.

B 554. Injury Experience in the Quarry Industry, 1952. Detailed Analysis of Safety Factors and Related Employment Data, by S. T. Reese and Naomi W. Kearney. 1955. 70 pp. Presents statistical data on fatal and nonfatal injuries and related employment at all quarries by States and kind of material for the year and for 1942–51. 40 cents.

B 555. Corrosive and Erosive Effects of Acid Mine Waters on Metals and Alloys for Mine Pumping Equipment and Drainage Facilities Anthracite Region of Pennsylvania, by S. H. Ash, H. A. Dierks, E. W. Felegy, K. M. Huston, D. O. Kennedy, P. S. Miller, and J. J. Rosella. 1955. 46 pp., 20 figs. Presents data on the corrosive and erosive effects of acid mine waters in the anthracite region on titanium, stainless steel, and other metals for pumping equipment and drainage facilities necessary to remove or control this water. 70 cents.

B 556. Mineral Facts and Problems, by the staff of the Bureau of Mines. 1956. 86 chapters. 1042 pp., 47 figs. An encyclopedia, presenting in simplified form and easily understood language, important reference material collected to assist the Bureau in programming its research and investigations,

makes easily available under one cover basic information on principal metals and minerals. Covers more than 85 mineral commodities and the industries based upon them and reviews history, industrial organization, geology, mining, production, uses, and other pertinent information on the commodities. The volume, the most comprehensive of its type ever prepared by a Federal agency, should prove valuable to educators and to executives and research workers in industry and in private, State, and Federal scientific institutions. $5.75.

B 557. Methods for Detecting and Determining Carbon Monoxide (Revision of Technical Paper 582), by R. L. Beatty. 1955. 34 pp., 10 figs. Discusses methods used for detecting and determining carbon monoxide in air and other gaseous mixtures. 30 cents.

B 558. Bibliography of Bureau of Mines Health and Safety Publications, January 1947–June 1955, by H. B. Humphrey and Hazel J. Stratton. 1956. 89 pp. (Supplements TP 705.) Describes Bureau publications on health and safety in the mineral and allied industries, from January 1947 through June 1955, with a selected number of earlier publications included for reference purposes. Lists 660 publications and includes a subject index and an author index. 50 cents.

B 559. Injury Experience in Coal Mining, 1952. Analysis of Mine Safety Factors, Related Employment, and Production Data, by Seth T. Reese, Virginia E. Wrenn, and Elizabeth J. Reid. 1955. 60 pp. Presents data on fatal and nonfatal injuries in bituminous-coal and Pennsylvania anthracite mines for 1952 and by States for 1952, historical data on coal-mine fatality rates for the United States during 1870–1952, and injury experience, employment, and production data for the year. 35 cents.

B 560. Flood Prevention in Anthracite Mines, Anthracite Region of Pennsylvania, Projects Nos. 4 and 5, by S. H. Ash, H. A. Dierks, D. O. Kennedy, and P. S. Miller. 1956. 23 pp., 16 figs. Fourth in series on a proposed tunnel system for collecting mine waters from the three major anthracite fields of Pennsylvania and for their discharge to tidewater, bulletin covers Projects Nos. 4 and 5, which provide for tunnels connecting with Projects Nos. 1, 2, and 3 to create a continuous gravity-drainage tunnel. Included are cost estimates for each project. (See also B 545.) $1.00.

B 561. Zirconium: Its Production and Properties, prepared by staff of Northwest Electrodevelopment Laboratory, Albany, Oreg. 1956. 180 pp., 138 figs. This publication, the most comprehensive ever issued on zirconium, covers many phases of experience in the metallurgy of this metal. Included are occurrences and mining and milling of the ore, methods of reduction, including the magnesium-reduction process, melting methods, properties, fabrication, alloys, uses, and general principles applying to the analytical chemistry of the metal. Large-scale production of zirconium was developed at Bureau's Northwest Electrodevelopment Laboratory at Albany by utilizing the Kroll process in recovering zirconium from its ores. The Bureau of Ships, Department of the Navy, and the Atomic Energy Commission aided in the development of this program. $1.00.

B 562. Mine Flood Prevention and Control: Anthracite Region of Pennsylvania. Final Report of the Anthracite Flood-Prevention Project Engineers, by S. H. Ash, H. A. Dierks, and P. S. Miller. 1957. 100 pp., 14 figs. Includes brief description of the anthracite region and the proposed Conowingo tunnel and the Marcus Hook alternate route tunnel, which would drain the anthracite mines of Pennsylvania; covers economic development of the anthracite region and improvements desired, geology and hydrology of the region, and problems considered; and gives construction program and cost for each project. (See also B 545.) 60 cents.

B 563. Combustion of Solid Fuels in Thin Beds, by E. P. Carman, E. G. Graf, and R. C. Corey. 1957. 92 pp., 76 figs. This bulletin, designed to promote development of better coal-burning equipment for commercial and industrial users and more efficient utilization of solid fuels for heating, describes an investigation of ignition and burning of solid fuels in thin beds, as on traveling- or chain-grate stokers, and study of pure crossfeed combustion. 65 cents.

B 564. Injury Experience in the Coking Industry, 1954. Detailed Analysis of Safety Factors and Related Employment Data, by Seth T. Reese and Naomi W. Kearney. 1956. 18 pp. Presents statistical data on fatal and nonfatal injuries at beehive and byproduct coke ovens by States and by causes for 1954 and facts on injuries and employment at all coke ovens from 1916 through 1954. 20 cents.

B 565. Syllabus of Clay Testing, by T. A. Klinefelter and H. P. Hamlin. 1957. 67 pp., 12 figs. Describes tests used by Bureau to determine properties and possible uses of clays from all parts of United States. (See also B 451.) 45 cents.

B 566. Injury Experience in the Quarry Industry, 1953. Detailed Analysis of Safety Factors and Related Employment Data, by Seth T. Reese and Naomi W. Kearney. 1956. 49 pp. Presents statistical data on fatal and nonfatal injuries and related employment at all quarries by States. 35 cents.

B 567. Analyses of Ash From United States Coals, by W. A. Selvig and F. H. Gibson. 1956. 33 pp. Gives analyses of 323 samples of ash of coal from 24 States and Alaska. Discusses occurrence of mineral matter in coal and relation of ash composition to its fusibility. This important reference work for users of coal supplements TP 679. 30 cents.

B 568. Development of the Fischer-Tropsch Oil Recycle Process, by H. E. Benson, J. H. Field, D. Bienstock, R. R. Nagel, L. W. Brunn, C. O. Hawk, J. H. Crowell, and H. H. Storch. 1957. 72 pp., 30 figs. Describes development of an oil-recycle process on a small, pilot-plant scale for conducting the Fischer-Tropsch synthesis of hydrocarbons from carbon monoxide and hydrogen mixtures (synthesis gas); presents results of tests for the period 1943–51. 45 cents.

B 569. General Properties of Low-Temperature Tar, by Manuel Gomez, John B. Goodman, and V. F. Parry. 1958. 31 pp., 8 figs. Summarizes general knowledge of low-temperature tar and traces the character of coal tar from incipient formation, through the condensation of the tar vapors, to the subsequent alteration of tar products resulting from further heating. 20 cents.

B 570. American Standard Recommended Practice for Drainage of Coal Mines (M6.1–1955, UDC 622.5) (Revision of American Recommended Practice for Drainage of Coal Mines, M6–1931): American Standards Association, sponsored by Bureau of Mines. 1957. 18 pp., 2 figs. Provides for standardized practice in using gathering pumps, permanent pumps, and piping for pumps and in operating pumps, storing mine water, natural drainage, and unwatering abandoned workings; recommends metals and alloys with acid-resisting qualities. Publication is revision of American Recommended Practice for Drainage of Coal Mines, M6, published by the American Standards Association under the sponsorship of the American Mining Congress in 1931. 20 cents.

B 571. Low-Temperature Carbonization Assays of North American Coals, by W. A. Selvig and W. H. Ode. 1957. 56 pp. 3 figs. Presents results of Fischer-Schrader bench-scale, low-temperature carbonization assays of coals from 19 States, Alaska, and British Columbia; describes procedure used in making the assays. 35 cents.

B 572. Analyses of Washington Coals. Supplement to Technical Papers 491 and 618, by Joseph Daniels, H. F. Yancey, M. R. Geer, R. F. Abernethy, S. J. Aresco, and F. E. Hartner. 1958. 92 pp., 1 fig. Contains analyses of samples collected by the Bureau and the Federal Geological Survey and analyses of coal delivered to the Government. Discusses progress in mine mechanization and cleaning, production, distribution, and use of coal in the State. 30 cents.

B 573. Micro-Seismic Method of Determining the Stability of Underground Openings, by Leonard Obert and Wilbur I. Duvall. 1957. 18 pp., 9 figs. Summarizes micro-seismic investigations conducted by Bureau between 1940 and 1955 to determine stability of underground mine openings; briefly reviews characteristics of micro-seismisms and micro-seismic equipment. 35 cents.

B 574. Index of Oil-Shale and Shale-Oil Patents, 1946–56. A Supplement to Bulletins 467 and 468 (in Three Parts). I. United States Patents, compiled by Simon Klosky. 1958. 134 pp., 242 figs. Gives abstracts of nearly 300 patents from 1946 to 1956 that relate to retorting (and distilling underground), refining, and utilization of oil shale and its products. Includes a few older patents omitted in earlier bulletins. 60 cents.

B 574. Index of Oil-Shale and Shale-Oil Patents, 1946–56. A Supplement to Bulletins 467 and 468 (in Three Parts). II. United Kingdom Patents, compiled by Simon Klosky. 1958. 75 pp., 92 figs. Includes abstracts of 180 patents from 1946 to 1956 that relate to retorting (and distilling underground), refining, and utilization of oil shale and its products. Includes a few older patents omitted in earlier bulletins. 40 cents.

B 574. Index of Oil-Shale and Shale-Oil Patents, 1946–56. A Supplement to Bulletins 467 and 468 (in Three Parts). III. European Patents and Classification, compiled by Simon Klosky. 1959. 62 pp. Includes abstracts of 250 patents from 1946 to 1956 that related to retorting (and distilling underground), refining, and utilization of oil shale and its products. Includes a few older patents omitted in earlier bulletins. 35 cents.

B 575. Occurrence and Determination of Germanium in Coal Ash From Powerplants, by R. C. Corey, J. W. Myers, C. H. Schwartz, F. H. Gibson, and P. J. Colbassani. 1959. 68 pp., 35 figs. Describes an investigation conducted to study the possibility of obtaining a potential supply of germanium from coal or coal ash; includes test procedures and results of surveys on coal-fire steam generators in central-station power-plants. 50 cents.

B 576. Helium-Bearing Natural Gases of the United States. Analyses and Analytical Methods. Supplement to Bulletin 486, by W. J. Boone, Jr. 1958. 117 pp., 9 figs. Presents analyses on more than 1,550 samples of natural gases from 27 States, including Alaska, and Canada. These samples were analyzed in connection with the helium-survey program of the Bureau of Mines. Includes samples analyzed from 1947 to May 1956, discusses methods of collecting gas samples, and presents historical background of helium survey. Supplements Bulletin 486. $1.25.

B 577. Operation of Experimental Plant for Producing Alumina From Anorthosite, by Hillary W. St. Clair, Douglas A. Elkins, Bertram K. Shibler, Warren M. Mahan, Robert C. Merritt, Mark R. Howcroft, and Mesami Hayashi. 1959. 127 pp., 34 figs. Describes the operation of an experimental alumina plant by the Bureau at Laramie, Wyo., for testing the feasibility of producing alumina from aluminum silicate minerals. $1.00.

B 578. Synthetic Liquid Fuels From Hydrogenation of Carbon Monoxide. Cobalt and Iron Catalysts for the Fisher-Tropsch Synthesis: Preparation and Characterization of Catalysts, Synthesis Tests, and Reaction Mechanism (Part 2 of Two Parts), by J. L. Shultz, L. J. E. Hofer, E. M. Cohn, K. C. Stein, and R. B. Anderson. 1959. 139 pp., 82 figs. This report completes the account of studies of cobalt catalysts begun in the first publication and describes the investigation of iron catalysts through 1953. Appendix describes apparatus and experimental procedures developed and gives a detailed account of the application of magnetic measurements to studies of ferromagnetic catalysts. Part 1 contained a review of the literature and results of the Bureau's research on cobalt and iron catalysts through 1946 and was issued as TP 709. $1.00.

B 579. Agglomeration Studies in the Low-Pressure Hydrogenation of Coal in a Fluidized Bed, by Walter Kawa, Raymond W. Hiteshue, William A. Budd, Sam Friedman, and Robert B. Anderson. 1959. 11 pp., 1 fig. Agglomeration, one of the principal difficulties in the low-pressure dry-coal hydrogenation of bituminous coal in a fluidized system, may be reduced or eliminated, according to this publication describing tests of four methods to overcome this problem. 15 cents.

B 580. Physical Chemistry of the Fischer-Tropsch Synthesis, by R. B. Anderson, J. F. Shultz, L. J. E. Hofer, and H. H. Storch. 1959. 25 pp., 12 figs. Summarizes results of physiochemical studies of the Fischer-Tropsch synthesis, a hydrogenation of carbon monoxide producing higher hydrocarbons and oxygenated organic molecules that have predominantly straight carbon chains. 25 cents.