

- †IC 7198. Marketing Natural Mineral Pigments, by Charles L. Harness. 1942. 26 pp., 1 fig. Revised as IC 7217.
- IC 7199. Some Suggestions on the Safe Use of Refrigerants, by H. H. Schrenk. 1942. 10 pp. Discusses properties of refrigerants, which serve as basis for following suggested control measures: Use of properly designed, constructed, and tested equipment to minimize leaks; limitation of quantity of refrigerant; choice of refrigerant and presents minimum potential hazard for conditions of use; use of proper installation and safety devices; and inspection and maintenance. Personal protective devices should be provided when necessary.
- †IC 7200. Strontium Minerals, by Charles L. Harness. 1942. 17 pp. Reviews economic background of strontium industry; discusses mining, preparation, uses, and domestic occurrence of these minerals; surveys industry in foreign countries; and gives imports of minerals and compounds and prices. Includes list of producers and buyers.
- IC 7201. Novel First-Aid Instructors Association, by Albert A. Munsch. 1942. 23 pp., 3 figs. Gives purpose, development, and constitution of Munsch First-Aid Instructors Association; outlines its organization and procedure for organizing district chapters; and summarizes advantages and work of association.
- †IC 7202. Marketing Silica (Quartz, Tripoli, Diatomite, Etc.), by Nan C. Jensen. 1942. 39 pp. Describes various forms of silica (world's most abundant mineral compound); discusses their occurrence, properties, and uses; and gives production and prices. Includes list of buyers.
- †IC 7203. Development of the Sand and Gravel Industry, by Shirley F. Colby. 1942. 23 pp., 5 figs. Reviews growth, general features, transportation problems, and labor requirements of sand and gravel industry; tabulates production by States, by size of output, and by size of plant; and discusses competition of crushed-stone industry with sand and gravel industry. Contains map showing commercial sources of supply of sand and gravel.
- †IC 7204. Tentative Coal-Mine Inspection Standards. 1942. 48 pp. Revised as IC 7268.
- †IC 7205. The Legendary "White Metal" and Its "Ore," by C. W. Davis. 1942. 5 pp. (Revision of IC 6000.) All authentic tests have given results that may be adequately explained by usual properties of materials concerned. Although under certain favorable conditions a hardening or alloying action might be effected or metallic iron might be extracted from some rocks, difficulty of obtaining reproducible results and of controlling composition of alloy would make practicability of such procedures doubtful. Well-known methods are available that can be controlled exactly.
- †IC 7206. New Process for Controlling Mercury Vapor, by Merle Randall and H. B. Humphrey. 1942. 10 pp. A new chemical-spraying process for controlling mercury vapor in mines and other closed and semi-closed spaces has proved effective in reducing mercury-vapor concentration enough to remove any serious health hazard, provided that "good house-keeping" is maintained and spray covers all exposed mercury droplets and dust. With reduction of health hazard in mines containing free quicksilver, many properties heretofore unprofitable for operation may be reopened. Also similar problems in other processes in which mercury is used may be solved.
- IC 7207. List of Permissible Mine Equipment Approved to January 1, 1942, by L. C. Ilsley. 1942. 35 pp. Revised as IC 7432.
- IC 7208. Coal-Mine Explosions and Coal- and Metal-Mine Fires in the United States During the Fiscal Year Ended June 30, 1941, by D. Harrington and W. J. Fene. 1942. 26 pp., 1 fig. Reviews record of fatalities from mine explosions and mine fires by States and by causes, compares lighting in mines where explosions occurred, and shows trend of fatalities in bituminous-coal mines.
- †IC 7209. Findings from Major Studies of Fatigue, by R. R. Sayers. 1942. 46 pp. Under compulsion of present urgency there is a tendency to demand relaxation of restrictions on hours of labor and to speed up all industrial processes. Data on fatigue and health show clearly relationship between fatigue and loss of working efficiency and increased accident occurrence, but there is little actual medical proof that long, fatiguing periods of work permanently affect efficiency, health, or working capacity. Circular discusses psychological and physiological phases of fatigue and methods of detecting and preventing industrial fatigue. Includes bibliography.
- IC 7210. Standard Methods for Measuring Extent of Atmospheric Pollution, by Carlton E. Brown and H. H. Schrenk. 1942. 19 pp., 3 figs. Describes recognized methods of measuring various forms of atmospheric pollution, evaluates significance of such measurements, and suggests suitable methods for obtaining comparative information on concentration of contaminants in city air.
- †IC 7211. Pointers on the Storage of Coal, by J. F. Barkley. 1942. 7 pp., 6 figs. Revised as IC 7235.
- IC 7212. Sodium Carbonate, by Charles L. Harness and A. T. Coons. 1942. 35 pp. Describes sodium carbonate (commonly known as soda ash) and methods of recovering it from natural sodas and of manufacturing it from common salt; discusses production, consumption, uses, history, imports and exports, and prices of soda ash; and gives occurrence of natural sodas by States. Also includes list of domestic producers of natural soda and of manufactured soda.
- IC 7213. Dredging Pennsylvania Anthracite, by Joseph A. Corgan. 1942. 25 pp., 6 figs. Describes recovery of anthracite from rivers and creeks in anthracite region of Pennsylvania. Such coal has found its way into watercourses as result of early-day methods of preparing anthracite for market, which rejected all small sizes as waste. With modern burning equipment, small sizes find a good market. Paper also includes a brief description of Pennsylvania anthracite fields.
- IC 7214. Questions and Answers on Storage of Coal in the Rocky Mountain Area, by V. F. Parry. 1942. 9 pp. Describes briefly methods of coal storage for householders, small industrial consumers, and large industrial consumers.
- †IC 7215. Vapor-Pressure Chart for Volatile Hydrocarbons, by R. Vincent Smith. 1942. 10 pp., 1 fig. Describes construction and use of vapor-pressure chart developed during study of physical properties of petroleum and natural gases, particularly fractional distillation of petroleum oils and natural gases in laboratories.
- IC 7216. Magnesium-Bearing Minerals in the Boulder Dam Area for the Production of Magnesium Metal, by J. Schlocker. 1942. 16 pp. Summarizes known ore deposits in Boulder Dam area that might be used as source of required magnesium oxide and clarifies question as to which type of deposit is potentially valuable for production of magnesium metal.
- †IC 7217. Marketing Mineral Pigments, by Charles L. Harness. 1942. 27 pp., 1 fig. (Revision of IC 7198.) Surveys paint industry and foreign trade in paints and pigments; discusses varieties, occurrence, methods of treatment, domestic production, and uses of mineral pigments; and gives pigment specifications and prices. Includes list of possible buyers of crude mineral pigments.
- IC 7218. Proposed Methods and Estimated Costs of Mining Oil Shale at Rulison, Colo., by E. D. Gard-

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- ner and Charles N. Bell. 1942. 59 pp., 13 figs. Discusses methods that would be adaptable to mining certain American oil shales, and treatment applies particularly to conditions existing in Green River formation on Naval Oil Shale Reserve No. 1. Estimates of mining costs, which were calculated on wages paid and prices of equipment and supplies in 1931, are based upon assumptions that are clearly stated. Wages in western Colorado have increased approximately 20 percent and prices of equipment and supplies about 33½ percent between 1931 and 1942. Power costs have remained about the same. All general costs per ton should be multiplied by 1.22 to raise them to 1942 level.
- †IC 7219. Marketing Strategic Mica, by Lawrence G. Houk. 1942. 24 pp., 3 figs. (Superseded by IC 7258.) Reviews Government program to stimulate domestic production of strategic mica and regulations controlling prices and uses; discusses nature and detrimental effects of impurities and imperfections of block mica, standard classification by quality, sizes in greatest demand, and other factors relating to consumers' needs; and gives instructions for obtaining priority ratings for purchase of new or operating equipment. Includes list of buyers and grinders of mica.
- †IC 7220. Home Insulation with Mineral Products. Conservation of Fuel for War, by Oliver Bowles. 1942. 11 pp. Discusses advantages of insulation, tells how it works and saving effected, and gives pointers for insulating homes. Describes mineral wool, vermiculite, and other mineral insulators and includes production statistics.
- IC 7221. Health Hazards from Inadequate Coal-Mine Ventilation, by R. R. Sayers. 1942. 18 pp. Discusses mine gases (asphyxiants and irritants), mine dusts, and prevention of underground atmospheric conditions hazardous to health; includes bibliography.
- IC 7222. Use of Diesel Locomotives in Tunnels, by S. H. Ash and L. L. Naus. 1942. 26 pp. Discusses hazards resulting from operation of Diesel engines underground, amount of fresh air required to maintain safe environment while such an engine is operating, and control and measurement of toxic gases in general tunnel air.
- IC 7223. Multiple-Shift Mechanical Mining in Some Bituminous-Coal Mines. Progress Report 4. Extraction of Pillars with Mechanical Equipment, by Albert L. Toenges, Earl R. Maize, and Frank A. Jones. 1942. 59 pp., 19 figs. Fourth in series of papers describing some methods and practices of mining coal mechanically where operations are conducted on more than one shift, with particular reference to methods of extracting pillars. (See also IC 7014, 7067, and 7178.)
- IC 7224. Directions for Laboratory Mineral Sizing, by John Dasher. 1942. 16 pp., 1 fig. Discusses units and properties of size, application of sizing, and methods of sizing (screening and Stokes' law).
- IC 7225. Marketing Lithium Minerals, by Lawrence G. Houk. 1942. 14 pp. Describes lithium minerals, their occurrence, technology, and uses; gives domestic and world production; and discusses markets, prices, and tests for lithium. Also lists lithium producers, lithium-ore buyers, and consumers and manufacturers.
- †IC 7226. High-Grade Dolomite Deposits in the United States, by John H. Weitz. 1942. 86 pp., 1 fig. Gives data on locations, extent, thickness, accessibility, workability, and chemical composition of high-grade dolomite deposits throughout the United States. Includes about 1,000 tabulations and analyses and map showing location of deposits.
- IC 7227. Dolomite-Base Refractories, by Alvin Schallis. 1942. 11 pp., 2 figs. Developments in manufacture of basic refractories from dolomite are believed to foreshadow era in which it will no longer be necessary to transport refractory magnesite over great distances, because refractories of local origin and of equal or superior quality will be available.
- IC 7228. Some Haulage and Hoisting Hazards in Western States, by E. H. Denny and H. B. Humphrey. 1942. 12 pp. Shows importance of haulage and hoisting hazards as revealed by Bureau of Mines accident statistics; analyzes briefly immediate contributing causes of some recent accidents; and discusses safety practices that have minimized number of haulage and hoisting accidents at many mines.
- IC 7229. How to Save Fuel at Home, by J. F. Barkley. 1942. 5 pp. Discusses various schemes for saving fuel and explains why they are effective, tells how heat is lost, and gives approximate fuel savings effected by weather stripping and insulation. Also contains suggestions for hand firing.
- IC 7230. Methods and Costs of Concentrating Hübnerite Ores at the Ima Tungsten Mine, Lemhi County, Idaho, by C. M. Dice. 1943. 14 pp., 1 fig. Describes operation of combined gravity-concentration, flotation, and magnetic-separation units for recovering tungsten concentrate and pyritic silver concentrate.
- IC 7231. Tentative Inspection Standards for Anthracite Mines. 1943. 42 pp. Revised as IC 7282.
- IC 7232. The Rare Alkalies in New England, by Frank L. Hess, Roscoe J. Whitney, Joseph Trefethen, and Morris Slavin. 1943. 51 pp., 13 figs. Describes rare-alkali deposits in Maine, Massachusetts, Connecticut, New Hampshire, and Vermont. Many New England pegmatites contain rare alkalies—lithium, rubidium, and cesium.
- †IC 7233. Monazite Sand, by Lawrence G. Houk. 1943. 19 pp. As monazite sand is only commercial source of cerium, other rare-earth metals, and thorium, which are essential to many industries, it is important in spite of the fact that only small quantities are used. This study includes properties, composition, occurrence, mining, treatment, foreign trade, prices, uses, and list of importers and consumers.
- †IC 7234. Marketing Kyanite and Allied Minerals, by Nan C. Jensen. 1943. 20 pp. Marketing study of minerals of sillimanite group—kyanite, andalusite, sillimanite, and dimortierite and allied minerals topaz and pinite. All can be employed for various refractory uses.
- IC 7235. The Storage of Coal; Revised and Expanded Edition of IC 7211, Pointers on the Storage of Coal, by J. F. Barkley. 1943. 14 pp., 3 figs. Answers five questions posed by coal purchasers when urged by the Government to store coal: (1) Will coal lose any of its heating value? (2) Will it slack and give smaller coal? (3) Will its burning characteristics change? (4) Will it catch fire from spontaneous combustion? (5) What precautions should be taken when coal is stored?
- †IC 7236. Selection, Use, and Maintenance of Respiratory Protective Devices, by H. H. Schrenk and S. J. Pearce. 1943. 12 pp. Selection of these devices requires careful consideration of hazards involved and knowledge of limitations, advantages, and disadvantages of devices obtainable.
- †IC 7237. List of Respiratory Protective Devices Approved by the Bureau of Mines, by H. H. Schrenk. 1943. 14 pp., 10 figs. Lists devices approved, according to type, pictures outstanding kinds, and gives names and addresses of companies manufacturing these apparatus.
- †IC 7238. Danger from Carbon Monoxide in the Home, by L. B. Berger and H. H. Schrenk. 1943. 8 pp. Em-

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- phasizes fact that any fuel-burning heating device may be a source of carbon monoxide unless adjusted and operated properly. Shows how accidents are caused by carbon monoxide and how to prevent them.
- IC 7239. Olivine, by G. Richards Gwinn. 1943. 11 pp. Olivine was first used commercially because of its refractory properties; work is in progress to make it available as low-cost raw material for production of magnesium metal. Discusses forsterite, fayalite, and dunite, properties, occurrences, and uses. Includes bibliography and lists of buyers and producers.
- †IC 7240. Permissible Mine Equipment Approved During 1942, by E. J. Gleim. 1943. 4 pp. Revised as IO 7432.
- IC 7241. Annual Report of Research and Technologic Work on Coal, Fiscal Year 1942, by Arno C. Fieldner and W. E. Rice. 1943. 63 pp., 18 figs. Gives results of studies on properties and composition of American coals, coal mining, preparation of coal, storage of coal, coal utilization, hydrogenation and liquefaction, and flammability of coal, metal, and organic dusts.
- †IC 7242. Synthetic Rubber: Its Production from Petroleum, Coal, and Other Materials, by W. C. Holliman. 1943. 86 pp. Includes chemical classification of synthetic rubbers, raw materials for production of crude synthetic rubbers, description of properties of individual synthetic rubbers, and bibliography.
- IC 7243. First Organization and Work of the Coal-Mine Inspection Division, Bureau of Mines. 1943. 138 pp., 5 figs. Shows how coal-mine inspectors were selected and trained, and reproduces material used by inspectors in studying mines.
- IC 7244. Some Information on the Transportation, Storage, and Handling of Lubricants in and About Coal Mines, by D. S. Kingery. 1943. 7 pp., 12 figs. As improper storage or handling of lubricants in coal mines has caused disastrous mine fires or has supported combustion in fires from other sources, importance of problem is evident.
- IC 7245. Some Information on Automatic Coupling of Mine Cars, by L. C. Hsley and E. J. Gleim. 1943. 6 pp., 8 figs. Coupling is responsible for about 20 percent of haulage accidents underground. Gives history of railroad coupling and reviews development of automatic couplers for mine cars.
- IC 7246. Stenches for Emergency Warnings in Metal Mines, by D. Harrington and J. H. East, Jr. 1943. 7 pp., 7 figs. Quick, effective method of warning miners underground of emergency requiring them to leave mine immediately, such as fire on surface or underground, is provided by introduction of stenches in compressed-air lines.
- †IC 7247. Economic Considerations in the Recovery of Magnesia from Dolomite, by Alvin Schallis. 1943. 58 pp. Reviews methods for recovering magnesia from dolomite, including methods of mechanical separation of lime and magnesia in dolomite and magnesitic limestone, processes for chemical separation of lime and magnesia in dolomite, and general economic considerations. Includes bibliography.
- IC 7248. Some Preliminary Data on Methods for Allaying Coal Dust in Tipples and Cleaning Plants, by D. S. Kingery. 1943. 11 pp., 7 figs. Reviews problems and conditions involved in suppressing coal dust at tipples and cleaning plants and systems employed by various companies in solving them.
- IC 7249. A Device for Sampling Material Carried by Silt-Bearing Streams, by Harry F. Weaver. 1943. 2 pp., 1 fig. Describes device that will obtain reasonably accurate samples of material from silt-bearing streams.
- IC 7250. Fires in Surface Mining and Milling Structures, by D. Harrington and J. H. East, Jr. 1943. 9 pp. Lists conditions that cause and aggravate fires and gives examples of recent plant fires at a West Virginia mine, two Oklahoma mills, a Colorado mine, a South Dakota mine, and a New Jersey mine.
- †IC 7251. Summary of State Laws Pertaining to Explosives. Part 1. District B. Connecticut, Delaware, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont. Prepared in the Office of the Solicitor, U. S. Department of the Interior, by Bernard M. Newburg, Bernard H. Levinson, and Charlotte T. Lloyd. 1943. 118 pp. Summary of State laws on explosives compiled primarily to ascertain what subjects relating to their control have been acted upon by each State legislature and, in general, how they have been treated. (See also IC 7252-7255.)
- IC 7252. Summary of State Laws Pertaining to Explosives. Part 2. Districts A and C. Kentucky, Maryland, Ohio, Pennsylvania, Virginia, West Virginia. Prepared in the Office of the Solicitor, U. S. Department of the Interior, by Bernard M. Newburg, Bernard H. Levinson, and Charlotte T. Lloyd. 1943. 73 pp. See IC 7251.
- †IC 7253. Summary of State Laws Pertaining to Explosives. Part 3. Districts E and F. Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Wisconsin. Prepared in the Office of the Solicitor, U. S. Department of the Interior, by Bernard M. Newburg, Bernard H. Levinson, and Charlotte T. Lloyd. 1943. 91 pp. See IC 7251.
- †IC 7254. Summary of State Laws Pertaining to Explosives. Part 4. Districts D and G. Alabama, Arkansas, Florida, Georgia, Kansas, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas. Prepared in the Office of the Solicitor, U. S. Department of the Interior, by Bernard M. Newburg, Bernard H. Levinson, and Charlotte T. Lloyd. 1943. 75 pp. See IC 7251.
- †IC 7255. Summary of State Laws Pertaining to Explosives. Part 5. District H. Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming. Prepared in the Office of the Solicitor, U. S. Department of the Interior, by Bernard M. Newburg, Bernard H. Levinson, and Charlotte T. Lloyd. 1943. 106 pp. See IC 7251.
- †IC 7256. Geophysical Abstracts 112, January-March 1943, compiled by W. Ayzazoglou. 1943. 45 pp. Bureau of Mines resumes publication of quarterly review of articles on geophysics in technical and scientific press and of patents covering devices for geophysical prospecting. Abstracts 87-111 were published in bulletins of the Geological Survey; the Bureau had issued Abstracts 1-86.
- †IC 7258. Strategic Mica, by G. Richards Gwinn. 1943. 21 pp., 3 figs. (Supersedes IO 7219.) Reviews Government program on mica, gives properties and specifications, economic aspects, preparation for market, list of Bureau of Mines publications, and glossary of terms.
- IC 7259. Accidents Due to Misuse of Explosives, by D. Harrington and J. H. East, Jr. 1943. 14 pp., 1 fig. Points out dangers inherent in handling explosives and gives examples of misuse—at mines in Kentucky, North Carolina, Colorado, Texas, California, Alabama, Utah, Nevada, and Wyoming; at a logging operation in Oregon; at quarries in Iowa and Washington; at a well in Colorado; and at a farm in New York.
- IC 7260. Supplementing Anthracite with Other Fuels for Home Heating, by W. T. Reid. 1943. 22 pp., 4 figs. Reviews properties of fuels proposed as temporary and partial substitutes for anthracite; indicates heating equipment most suitable for burning sub-

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stitute fuel, either alone or in combination with anthracite; and points out variations in firing and operating techniques to obtain greatest heating satisfaction.

- †IC 7261. Recent Developments in Fuel Supply and Demand, by Arno C. Fieldner. 1943. 27 pp., 5 figs. Reviews changes in fuel supply and demand since 1937; discusses rise in use of petroleum, including displacement of coal by fuel oil, and rise in use of natural gas; describes improvements in coal production and utilization; summarizes national reserves of fuel and their potential energy; and touches on influence of war on demand for fuel and postwar trends in fuel supply and demand.
- IC 7262. Mine-Fan Signal Alarms and Power Releases, by W. J. Fene and H. F. Weaver. 1943. 8 pp., 11 figs. Automatic power releases and signals can be used to advantage in any gassy mine. Besides being factors of safety in releasing power and giving warning when fan stops running or a door is left open, at many mines they eliminate use of attendant.
- IC 7263. Industrial Insulation with Mineral Products, by Oliver Bowles. 1943. 17 pp. Describes advantages and properties of such mineral products as mineral wool, asbestos, basic magnesium carbonate, vermiculite, diatomite, and other insulating materials.
- †IC 7264. Natural Mineral-Paint Extenders, by Charles L. Harness. 1943. 19 pp. Describes minerals used to increase bulk of paint while reducing its unit cost. Such minerals include talc, mica, clay, barite, witherite, ground quartz, diatomite, tripoli, gypsum, whiting, siliceous dolomite, slate flour, celestite, magnesite, and asbestos.
- IC 7265. Trends in Consumption and Prices of Building Materials, by Oliver Bowles and Nan C. Jensen. 1943. 24 pp. Traces history and place in present-day economy of such inorganic nonmetallics as cement, crushed stone, sand and gravel, building stone, roofing slate, building lime, and gypsum. (See also IC 7320.)
- IC 7266. Graphite—Natural and Manufactured, by G. Richards Gwinn. 1943. 26 pp. Includes description, geologic occurrence, locality of domestic and foreign deposits, uses, possibilities for domestic graphite, lists of producers and buyers, and bibliography.
- IC 7268. Tentative Bituminous and Lignite-Mine Inspection Standards, Revised September 1943. 1943. 54 pp. (Revision of IC 7204.) Revised as IC 7333.
- †IC 7269. Marketing Magnesite and Allied Products, by Charles L. Harness and Nan C. Jensen. 1943. 25 pp. Economic study of mining, preparation, and uses of magnesia raw materials, including brucite, dolomite, raw sea water, seawater bitterns, well brines, and magnesium silicates; includes lists of dealers and buyers.
- IC 7270. Marketing Vermiculite, by G. Richards Gwinn. 1944. 15 pp. Describes characteristics of vermiculite; gives geologic occurrence, history, domestic and foreign deposits, preparation, and uses; lists producers; bibliography.
- IC 7271. Use and Misuse of Flame Safety Lamps, by W. H. Tomlinson. 1944. 14 pp. Gives examples of coal-mine explosions that were caused by carelessness in the use of flame safety lamps underground, as well as examples of lack of care in handling such lamps, and lists some steps that can be taken to prevent explosions from this cause.
- †IC 7272. Annual Report of Research and Technologic Work on Coal, Fiscal Year 1943, by A. C. Fieldner, J. C. Beltz, and P. L. Fisher. 1944. 58 pp., 35 figs. The eighth of a series of reports on properties and composition of American coals, coal mining, preparation, storage, utilization, and hydrogenation and liquefaction of coal.
- IC 7274. Coal-Mine Explosions and Coal- and Metal-Mine Fires in the United States During the Fiscal Year Ended June 30, 1943, by D. Harrington and W. J. Fene. 1944. 27 pp., 1 fig. During the fiscal year 1943, 32 explosions were known to have occurred in 13 States and to have caused 152 deaths; a fire in West Virginia caused 13 deaths.
- †IC 7275. Accidents to Children from Blasting Caps, by D. Harrington and R. G. Warncke. 1944. 18 pp. Reviews examples of accidents where children were injured by careless handling of caps. Stresses importances of instruction and discipline by adults and more careful disposal of caps.
- †IC 7276. Fluorescent Minerals Used in Lighting and Elsewhere, by Oliver C. Ralston and A. George Stern. 1944. 18 pp., 7 figs. Defines fluorescent and discusses fluorescent lighting and fluorescent minerals.
- IC 7277. Langbeinite, by Bertrand L. Johnson. 1944. 12 pp. Langbeinite—a mineral that has been reported from only five countries—is source of fertilizer advantageous for soils showing magnesium deficiency or requiring sulfate fertilizers. Paper gives history, occurrence, uses, and domestic deposits.
- IC 7278. Some Suggestions on Care in the Use and Handling of Explosives in Coal Mines, by Lloyd G. Fitzgerald. 1944. 7 pp. Stresses importance of proper and adequate surface storage, care in transportation, and use of permissible explosives instead of black blasting powder. States that companies should draw up operating codes and insist that they be followed.
- †IC 7279. Loss of Life Among Wearers of Oxygen Breathing Apparatus, by G. W. Grove. 1944. 26 pp. Although thousands have been trained in use and care of breathing apparatus and these devices have been worn with safety on numerous occasions, in 26 accidents men have lost their lives while wearing them. These accidents are described to serve as object lessons.
- IC 7280. Standard Construction of Mine Ventilating Doors, by J. C. Hartley and A. C. Moschetti. 1944. 4 pp., 1 fig. Certain mining conditions, especially where ventilation system is complex, necessitate use of doors along haulageways to have efficient couring of air to faces. Paper describes standardized construction of doors and door frames along haulageways in anthracite colliery in Pennsylvania.
- IC 7281. The Burning Rate of Fuse, by D. Harrington and R. G. Warncke. 1944. 10 pp. Gives examples of accidents that followed when blasters misjudged burning rate of fuse and stresses precautions to be used when fuse is employed.
- †IC 7282. Tentative Inspection Standards for Anthracite Mines. 1944. 48 pp. (Revision of IC 7281.) Revised as IC 7449.
- †IC 7283. Permissible Mine Equipment Approved During 1943, by E. J. Gleim. 1944. 5 pp. Revised as IC 7432.
- IC 7284. Possible Hazards Attending the Use of Engines Operated on Butane Fuel in Mining and Tunneling, by L. B. Berger and H. H. Schrenk. 1944. 6 pp. In response to requests for information regarding use of butane in underground operations, tests by Bureau engineers show that use of this fuel may create potential hazards comparable with those attending use of gasoline underground.
- †IC 7286. Influence of Humidity Upon the Resistivity of Solid Dielectrics and Upon the Dissipation of Static Electricity, by E. M. Cohn and P. G. Guest. 1944. 41 pp., 7 figs. Includes list and abstracts of literature dealing with electrical conductivity of solid dielectrics, including all its aspects and its relationships to other physical properties of these materials.

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- †IC 7287. Hazards from Common Gases and Vapors Encountered at Surface Disasters, by G. W. Jones. 1944. 15 pp. Provides information written in non-technical language on the flammability (explosibility) of common gases and vapors in order that rescue workers may be informed on the various factors involved and take the necessary precautions to protect themselves and those to be rescued.
- †IC 7288. Precautions to Be Taken When Approaching Old Mine Workings, by D. Harrington and R. G. Warncke. 1944. 20 pp. Shows dangers of working in neighborhood of old or abandoned workings, particularly when their present condition is not known. Gives examples of accidents that have occurred when precautions were not taken, and lessons taught by accidents.
- IC 7289. Suggested Hoisting-Signal Code for Metal-Mine Shafts, by D. Harrington and J. H. East, Jr. 1944. 13 pp. Because of confusion that results from differences of metal-mine-shaft signal codes among mines and among States, writers suggest a standardized simplified form. Codes of Arizona, California, Colorado, Montana, and Nevada are quoted.
- †IC 7290. Testing Safety Catches on Mine Cages at Some Eastern Bituminous-Coal Mines, by H. J. Sloman. 1944. 20 pp., 12 figs. Gives excerpts from the mining laws of various States with respect to the necessity for safety catches on mining cages, describes the types of catches inspected in this investigation and the method of testing them, and describes in detail the safety-catch testing method followed at 11 mines.
- IC 7291. Suggested Hoisting-Signal Code for Slope Coal Mines and for Shaft Mines Having Only One Level, by D. Harrington and J. H. East, Jr. 1944. 9 pp. As uniform safety code for coal mines that hoist from one level has not been adopted by all coal-mining States, many accidents have been caused by miners unfamiliar with variations among mines and among States. Suggested code is offered for consideration by States and organizations concerned with welfare of miners. State codes of Pennsylvania, Ohio, Illinois, Colorado, and New Mexico and Geological Survey code are included.
- †IC 7293. Mining and Milling Operations of the Rutile Mine of the Titanium Alloy Co. of Arkansas, Hot Spring County, Ark., by Felix A. Vogel, Jr. 1944. 7 pp., 1 fig. Describes operations at new mine and mill of Titanium Alloy Co. of Arkansas, which produces rutile concentrate used in manufacture of welding rods, smoke-screen chemicals, and alloys.
- †IC 7294. Prospect Trenching with Caterpillar-Mounted Angledozer, by S. H. Lorain. 1944. 8 pp. Describes use of equipment which has increased scope and speed and reduced cost of prospecting many kinds of mineral outcrops. Report discusses work by angledozer on nine Bureau of Mines exploration projects and provides tables of data upon performance and cost.
- IC 7295. Corundum, by Robert W. Metcalf. 1944. 18 pp. Discusses composition and properties of corundum, as well as origin and occurrence, imports, uses, mining, and milling. Includes bibliography.
- IC 7296. Blasting Hazards in Strip Mines Adjacent to Underground Workings, by J. J. Forbes and H. F. Weaver. 1944. 5 pp. Explains in detail the safety measures that should be followed when blasting in strip mines adjacent to underground mines, particularly because of the liberation of toxic gases, which often are drawn into the underground workings, jeopardizing the lives of employees. According to the report, surface blasting should be permitted only after underground employees have been withdrawn from the mine, and they should not be permitted to reenter until the workings are free from concentrations of harmful gases.
- IC 7297. Control of Silicosis Hazard by Substitution of Quartz-Free or Low-Quartz Material for Sand Under Mine Locomotives, by Carlton E. Brown and H. H. Schrenk. 1944. 5 pp. Because certain sands used to increase the traction of locomotives in some mines contain abrasive silica dust which may lead to silicosis among employees, this report suggests the use of quartz-free or low-quartz materials for such purposes. Listed as possible substitutes are granulated slag from blast furnaces and copper furnaces, lava, and cinders, some of which are being tested in mines to ascertain their efficiency. To further interest in the determination of suitable substitutes, the report announces that information regarding tests with these materials will be disseminated among mine operators if reported to the Bureau of Mines.
- †IC 7298. Some of the Hazards of Auxiliary Fans in Coal Mines, by D. Harrington and R. G. Warncke. 1944. 27 pp. The use of dangerous portable blower fans in coal mines of the Nation is increasing despite the fact that such equipment has been the direct or indirect cause of many explosions, according to a survey among 900 coal mines examined by Federal coal-mine inspectors. In describing the inspectors' findings, this report cites the numerous hazards created by blower fans: Recirculation of the air, which may permit harmful accumulations of noxious or explosive gas; the movement, en masse, of bodies of gas from rooms to entries where ignition sources may be encountered; the use of nonpermissible motors on the fans, which may ignite gas; and the possibility of a fire originating at the fan installation. The report shows that only 40 of the 1,184 auxiliary fans examined by the coal-mine inspectors had a type of motor control that would not cause an ignition if operated in an explosive mixture of gas and air.
- †IC 7299. Bureau of Mines Exploration of Mercury Deposits to June 30, 1944, by McHenry Mosier. 1944. 15 pp., 1 fig. The procedure used by Bureau in exploring mercury deposits is discussed in this paper, which also reviews results of the work, by projects. A total of 190 deposits was examined, including 43 in Nevada, 38 in California, 31 in Arkansas, and 27 in Oregon.
- †IC 7300. Milling and Smelting Operations of the Magma Copper Co., Superior, Ariz., by Edward J. Caldwell. 1944. 38 pp., 5 figs. Revises description of milling process given in IC 6319, published in 1930, and adds discussion of smelting methods in some detail. Flow sheets are included.
- IC 7301. Fuel for Permissible Flame Safety Lamps (a Revision of RI 3389), by A. E. Hooker and E. J. Coggeshall. 1945. 6 pp., 1 fig. Fuels suitable for use in permissible flame safety lamps, sources of supply, and suggestions relating to the assembly and care of the lamps are included. It also contains information on the availability of each of the approved fuels in the various mining areas.
- IC 7302. Prevention of Fires Caused by Electric Arcs and Sparks from Trolley Wires, by F. E. Griffith, E. J. Gleim, R. T. Artz, and D. Harrington. 1944. 10 pp. Suggests ways to minimize and prevent dangerous electric arcs and sparks, particularly those resulting from bare trolley circuits.
- †IC 7304. Bibliography of Bureau of Mines Investigations on the Production of Liquid Fuels from Oil Shale, Coal, Lignite, and Natural Gas, by Arno O. Fieldner and Paul L. Fisher. 1945. 18 pp. Gives a list of 236 references to reports by Bureau of Mines scientists and engineers, in Bureau publications and technical journals, grouped under following headings: Oil shale and shale oil; carbonization of coal and lignite; direct hydrogenation of coal,

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- lignite, and tar; and synthesis of methanol and hydrocarbons. Citations of testimony presented before various Congressional committees are included.
- IC 7305. Successful System for Signaling from Mine Cages at Rest or in Motion, by Carl Belsler. 1944. 5 pp., 15 figs. Gives construction details of two methods used by the Park Utah Consolidated Mines Co. for signaling from moving mine cages. The system has been operated efficiently and at low maintenance for several years.
- †IC 7306. Natural-Gasoline Plants in the United States. January 1, 1944, by F. S. Lott and E. M. Seeley. 1945. 19 pp. Lists more than 650 natural-gasoline plants in operation on January 1, 1944, with name of company, location, daily capacity (in gallons), status, and type. The productive capacity of United States natural-gasoline plants has increased from 11,662 thousand gallons daily to 16,013 thousand gallons, an average gain of 9.3 percent per year.
- IC 7307. Surface Storage of Explosives, by D. Harrington and R. G. Warncke. 1945. 16 pp., 13 figs. Sketches and drawings in this publication illustrate the basic requirements for explosives magazines designed to prevent theft, fire, deterioration, and detonation of the contents. Suggested materials and types of construction are based largely on regulations and latest requirements (June 1, 1944) of the Federal Explosives Act. Effects of improper storage also are discussed.
- IC 7308. Shaft Sinking by Stripping Churn-Drill Holes, by W. A. Cole. 1945. 6 pp., 2 figs. Describes the solution of the problem of inexpensive shaft sinking under favorable conditions at Ditney Hill mine of Ingle Coal Corporation, Elberfeld, Ind. Two vertical shafts, 8 feet in diameter, were sunk at this mine by stripping a 12-inch-diameter churn-drill hole, into which muck was shoveled and dropped to mine workings below, where it was loaded mechanically and stowed in abandoned rooms.
- †IC 7309. Industrial-Dust Explosions, by Hylton R. Brown. 1945. 7 pp. Laboratory tests indicate that many dusts now produced in the course of various manufacturing operations can form explosive mixtures in air. More than 130 carbonaceous dusts, 50 metal and alloy dusts, and 50 resins and powders used in the plastics industry have been tested and classified according to explosibility. Although explosive qualities of these substances differ, fundamental principles for preventing explosions are the same—to prevent formation of dust clouds and to eliminate all sources of ignition.
- †IC 7311. The Hazard of Hydrogen Fluoride Poisoning in the Mineral and Allied Industries, by R. R. Sayers and Sara J. Davenport. 1945. 51 pp. Prompted by the increasing use of hydrogen fluoride and its occurrence as a byproduct in the mineral industries, the Bureau presents in this publication a comprehensive review of available literature covering the hazards, prevention, and treatment of hydrogen fluoride poisoning. Bibliography included.
- †IC 7312. Trends in Exploration of Mineral Deposits, by Lowell B. Moon. 1945. 6 pp. In describing the methods for exploring mineral deposits, this paper states there is no best method of exploring all mineral deposits, but there is usually a best method or combination of methods for exploring any given deposit. As the higher-grade and more easily accessible deposits are depleted, two trends in mining, and consequently in exploration, are developing. The first is the result of the necessity to gather up the comparatively high-grade "crumbs" of ore left in small and out-of-the-way deposits. The second is toward exploration and utilization of large but lower-grade or more deeply situated deposits.
- †IC 7313. Paligoraskite, a Possible Asbestos Substitute, by Robert B. Fisher, Robert L. Thorne, and Corbin Van Cott. 1945. 5 pp. To acquaint manufacturers of asbestos products with the industrial possibilities of paligoraskite, a type of asbestos usually called mountain leather, Bureau describes the examination of an Alaskan deposit of this unusual mineral, reports on laboratory tests of samples, and suggests that paligoraskite may be used in soundproofing, insulating, and shock-absorbing, and other products. Work done in cooperation with School of Mines and Metallurgy of University of Missouri.
- †IC 7314. Reclaiming Used Pipe for Oil-Field Operations with Cement Linings, by Peter Grandone. 1945. 10 pp., 3 figs. Describes process of reclaiming badly corroded oil-field pipe by lining it with cement and returning it to service, thus effecting a substantial saving in steel. The process has enabled many oil producers to continue and even expand operations at lower costs, and to protect pipe against further corrosion, particularly in those areas where corrosive brines and hydrogen sulfide mixtures are handled.
- †IC 7315. A Pattern for Western Steel Production, by H. Foster Bain. 1945. 35 pp., 4 figs. Favorable opportunities exist for the West's war-expanded steel industry in the postwar period, provided some obstacles—serious though not insurmountable—are overcome, according to this report. Describes expansion of the industry as well as increase in population and in consumption of steel in the West, outlines existing favorable conditions, and lists obstacles to be overcome in postwar period.
- †IC 7316. Permissible Mine Equipment Approved During 1944, by A. B. Hooker. 1945. 4 pp. Revised as IC 7432.
- †IC 7317. Diamond Drilling of Blast Holes, Lake Superior District Iron-Ore Mines, by Ernest W. Johnson and Frank E. Cash. 1945. 11 pp., 2 figs. According to this report, dust made while drilling blast holes is materially reduced as compared with wet-type percussion drills, based on diamond-drilling experience at the Soudan and Anvil-Palms mines in the Lake Superior district.
- IC 7318. Electronic Mine-Shaft Signal System at Magma Copper Co., Superior, Ariz., by H. C. Loeche. 1945. 4 pp., 4 figs. In some States, the law requires two separate systems of signaling the hoisting engineer. A system by which the hoisting engineer can be signaled from the cage, whether it is at rest or in motion, should always be one of these systems. System described in this report is fully as economical as one operated from the levels, when its many advantages are taken into consideration and its original cost is spread over a number of years.
- †IC 7319. World Survey of Tantalum Ore, by James S. Baker. 1945. 48 pp., 5 figs. Gives a general review of the world production, consumption, price trends, uses, substitutes, and processing facilities of tantalum, a rare metal which has emerged as a critical material of World War II.
- IC 7320. Trends in Consumption and Prices of Chemical Raw Materials and Fertilisers, by Oliver Bowles and Ethel M. Tucker. 1945. 27 pp., 2 figs. Comprehensive survey of trends and consumption and prices of chemical raw materials and fertilisers during the eventful years between 1910 and 1943, with emphasis on the increasingly important role these industries have played in the economic development of the Nation, is presented. Second in a series on the more important nonmetallic minerals, it shows that dollar value of chemical production in the United States rose from \$2,105,278,610 in 1899, to \$11,102,898,496 in 1939, with indications that the figure may have exceeded 15 billion dollars in 1944. (See also IC 7265.)

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- IC 7321. Accident Experience, Iron-Ore Mines, Lake Superior District, 1940-43, by Frank E. Cash and Reuben D. Larsen. 1945. 9 pp. The frequency and severity of accidents in the iron-ore mines of the Lake Superior district increased during the 4-year period 1940-43, but the rates generally were below those of other iron-mining districts of the Nation, according to this survey of an area that produces about 85 percent of the domestic iron-ore tonnage. Gives shipment of ore, man-hours worked, number and severity of accidents, days lost, comparisons with other mining districts, accidents by types of operations, and other pertinent facts.
- †IC 7322. Annual Report of Research and Technologic Work on Coal, Fiscal Year 1944, by A. C. Fieldner, P. L. Fisher, and R. E. Brewer. 1945. 79 pp., 18 figs. Accomplishments of Bureau engineers and scientists in the field of coal research and technology, including inspection and analysis, mining and exploration, gas-and-dust explosions, coal preparation and storage, fuel efficiency, carbonization, and synthetic liquid fuels are reviewed in this publication covering the period from July 1, 1943, to June 30, 1944.
- †IC 7323. Bibliography of Russian Literature on Geophysical Exploration 1929-41, by W. Ayzoglou and V. Skitsky. 1945. 44 pp. During the interval 1921-41, geophysical exploration in Russia made considerable progress, as publications show. The greater part of these publications was available during the preparation of Geophysical Abstracts and has been abstracted in them. A considerable portion of these missing publications is now listed in bibliographic form, in view of their interest to geophysicists. All publications entered in the bibliography are in Russian.
- IC 7325. Testing Safety Catches on Mine Cages, Lake Superior District, by Clyde M. Pearce and Frank E. Cash. 1945. 12 pp., 12 figs. Gives a comprehensive survey of the methods of testing safety catches on cages used for transporting men at 13 iron-ore mines of the Lake Superior district. The information was gathered by Bureau men during routine inspections of iron mines in the Lake Superior region to establish security standards. In all of the 13 mines included in the survey, monthly drop tests were made to determine effectiveness of safety catches. There are numerous diagrams of testing devices and safety catches currently employed in Lake Superior area, and existing State regulations relating to the use of these mechanisms are reviewed.
- †IC 7326. Extractive Metallurgy of Beryllium, by W. J. Kroll. 1945. 15 pp. The production of beryllium metal and its alloys is one of the most difficult tasks in metallurgy. Methods for producing the metal and the production of beryllium alloys are described. Bibliography included.
- †IC 7327. Processes for Making Barium and Its Alloys, by W. J. Kroll. 1945. 16 pp., 4 figs. Barium, a mineral plentiful in nature but expensive to prepare in metallic form, is now selling in small lots at \$15 a pound but probably could be produced at a cost of less than 45 cents a pound by a large-scale operation using processes reviewed in this publication. Barium alloys can be made readily, and the chemical methods for producing the alloys would compete on this cost basis. Two apparatus for making barium by the Guntz process are described. Bibliography included.
- IC 7328. Hazards of the Trolley-Locomotive Haulage System in Coal Mines, by D. Harrington and R. G. Warncke. 1945. 38 pp. Electric trolley-locomotives used in coal mines are efficient, economical, and responsible in part for the rise in America's coal production in the past 4 decades, but they also have caused the loss of hundreds of lives, millions of dollars worth of property, and an unknown amount of potential coal tonnage. Safety precautions suggested to minimize the hazards are given, and report includes 3 tables covering the years 1930-44 and showing that fatalities resulting from contact, explosion, and fire caused by trolley-locomotive systems totaled 815, while fatalities from all other electrical causes combined totaled 826.
- †IC 7329. Hydrogen Sulfide Poisoning as a Hazard in the Production of Oil, by Sara J. Davenport. 1945. 10 pp. Describes properties, toxicity, and physiological action of hydrogen sulfide. The treatment and prevention of hydrogen sulfide poisoning are also described. Bibliography included.
- IC 7330. Coal-Mine Explosions and Coal- and Metal-Mine Fires in the United States During the Fiscal Year Ended June 30, 1944, by D. Harrington and W. J. Fene. 1945. 35 pp., 1 fig. Although the explosion-fatality record for the fiscal year 1944 showed considerable improvement over those of the preceding 4 years, it is still far from creditable, and in view of present knowledge of methods of preventing explosions and fires, such disasters are inexcusable. A number of safety measures designed to prevent coal-mine explosions and fires and metal-mine fires are included in the appendix.
- IC 7331. Dust-Counting Cells, by Carlton E. Brown, R. L. Beatty, and T. B. Kirby. 1945. 9 pp., 2 figs. Contains information about dust-counting cells for scientists engaged in industrial studies of dust and its effect on health. Describes several types of counting cells, including a new dual cell, as well as methods of making simple and inexpensive ones.
- IC 7332. Guarding Trolley Wires in Mines, by E. J. Gleim. 1945. 19 pp., 8 figs. Discusses various types of trolley-wire guards that have been used in coal and metal mines in this country, with working drawings of the most effective installations. State laws of Ohio, Oklahoma, Pennsylvania, California, Alabama, and Utah relating to guards are cited, as well as regulations of the Union Pacific Coal Co. and rules jointly sponsored by the American Mining Congress and the Bureau of Mines.
- IC 7333. Inspection Standards for Bituminous-Coal and Lignite Mines, Revised July 1945. 1945. 57 pp. The revised inspection standards or recommendations herein have been prepared for use in Federal inspection of bituminous-coal and lignite mines. They succeed a compilation of similar standards published as Bureau of Mines IC 7268 in December 1943 and employed as a guide in Federal inspections since that time. Important alterations and additions have been made because of changes in mining practice and temporary shortages of some safety equipment.
- †IC 7334. Method of Handling Hydrogen Sulfide Gas in the Elk Basin Oil Field of Wyoming, by J. H. East, Jr., and Ralph H. Espach. 1945. 7 pp., 4 figs. The occurrence of hydrogen sulfide in the gas in solution in the oil produced from the Tensleep sandstone in the Elk Basin oil field in Wyoming constitutes a serious hazard to persons working in that field. In October 1943 and November 1944 Bureau of Mines investigated methods used in handling the oil and in disposing of the hydrogen sulfide that occurs with it. General recommendations for the prevention of hydrogen sulfide poisoning in the oil fields are listed.
- IC 7335. Destruction of Damaged, Deteriorated, or Unwanted Commercial Explosives, by R. D. Leitch and P. R. Moyer. 1945. 6 pp. Describes proper methods to be employed for destruction of unwanted explosives.
- †IC 7336. Shaft Sinking by Rotary Drilling, by D. H. Platt. 1945. 14 pp., 7 figs. Describes use of rotary drills to sink shafts at Arkansas bauxite mines. Standard oil-well rotary equipment is used, and the derricks are adapted from a type common in oil

†Out of print.

- fields. It has been found that shafts in circular cross section, lined with steel casing surrounded by a cement seal, have structural advantages superior to those of shafts supported by timber and sheeting. Where formations are loose and water-filled, shaft sinking with a rotary drill is exceptionally practical, economical, and safe.
- IC 7337. Fluorescence Test for Uranium, by Claude W. Sill and H. E. Peterson. 1945. 6 pp., 4 figs. Uranium, the source of the destructive atom bomb's tremendous power, can be detected readily in low-grade complex uranium-vanadium ores by a relatively simple and speedy qualitative test developed and used successfully by Bureau of Mines and described in this report. Based on the known fact that certain uranium salts fluoresce under ultraviolet light and certain solutions of uranium salts also fluoresce under proper conditions, the Bureau process utilizes short-wave ultraviolet light. It is sensitive enough to indicate amounts of uranium that would ordinarily be detected in the most precise chemical methods, yet is not so sensitive as to give positive reactions with mere traces of uranium. The process also has been found applicable to the detection of uranium in columbium-tantalum ores.
- †IC 7339. Mining and Milling Operations of the Southwestern Graphite Co., Burnet County, Tex., by A. E. Needham. 1946. 9 pp., 1 fig. Graphite produced in Burnet County, Tex., is finding favor with American consumers and may compete successfully with imported graphite. Describes mining and milling operations of Southwestern Graphite Co. By rearranging some milling steps and eliminating others, plant capacity was increased, grade concentrate was increased, and amount of carbon lost in refuse was decreased.
- IC 7340. Hazards from Chlorates and Perchlorates in Mixtures with Reducing Materials, by Irving Kabik. 1945. 6 pp. Stresses the hazardous nature of combustible chlorate mixtures and shows the necessity of testing carefully and thoroughly perchlorate mixtures before their acceptance.
- IC 7341. Survey of Literature on the Metallurgy of Zirconium, by W. J. Kroll and A. W. Schlechten. 1946. 50 pp. Useful information on metallurgy of corrosion-resistant zirconium metal, with a description of its extraction, production, alloys and compounds, and various uses. Report compiled from numerous patents and publications and intended as an aid to industry in commercial development of zirconium. Zirconium metal, easily drawn into wires and rolled into thin sheets, is used in electronic tubes, electrical condensers, X-ray filters, lamp filaments, and photo-flash bulbs. Many valuable alloys are formed by mixing zirconium with other metals. Bibliography included.
- IC 7342. Backfilling Problem in the Anthracite Region as It Relates to Conservation of Anthracite and Prevention of Subsidence, by S. H. Ash and James Westfield. 1946. 18 pp. Federal participation in a cooperative "backfilling" program to prevent surface cave-ins in the anthracite region of Pennsylvania is recommended in this report, which describes a plan for filling worked-out underground areas with waste or other material. Presents the various systems of backfilling and the technical problems involved. Bibliography included.
- IC 7343. Storage of Explosives in Underground Mines of the Lake Superior District, by Frank E. Cash. 1946. 9 pp., 22 figs. Describes safeguards incorporated in new magazines in the underground iron-ore mines of Lake Superior district, where a progressive trend toward safer storage of explosives has developed in recent years. An outline of practices employed by some mines in transporting explosives from surface to magazines and detailed description of location and arrangement of 23 explosives-storage magazines built within the past 2 years are included. Photographs and sketches illustrate 2 explosives cars, 8 magazine lay-outs, and several magazine entrances and interiors.
- †IC 7344. The Properties and Uses of Helium (Including a Comprehensive Bibliography, 1933-45), by Henry P. Wheeler, Jr. 1946. 66 pp., 6 figs. Discusses thermal and electrical properties and uses of helium and contains tables showing properties of helium and some other gases. Bibliography included.
- †IC 7345. Mining and Marketing of Barite, by Charles L. Harness and F. M. Barsigian. 1946. 75 pp., 2 figs. Barite, used extensively in oil-well drilling and for many other industrial purposes, is now produced in United States in sufficient quantities to meet all major domestic requirements. Arkansas, Missouri, Georgia, Tennessee, California, and Nevada are leading production areas in United States. Domestic distribution of barite is confined to three general marketing areas, the Pacific, Central, and Eastern districts.
- IC 7346. A Graphical Form for Applying the Rosin and Rammler Equation to the Size Distribution of Broken Coal, by W. S. Landers and W. T. Reid. 1946. 5 pp., 1 fig. Explains use of a convenient and accurate form for applying Rosin and Rammler equation in expressing distribution of sizes in broken coal. Designed by Bureau of Mines, a free sample of this form, accurately ruled and printed, also is available. The equation is finding wide application in research and industrial problems relating to the utilization of coal and coke, and use of the graphical method saves cumbersome mathematical computations.
- IC 7347. Utilization of Natural Gas for Chemical Products, by Harold M. Smith and W. C. Holliman. 1947. 24 pp., 12 charts. (Revision of IC 6388 and 7108.) Shows in graphic form general reactions used and chemical products that may be obtained when natural gas is used as raw material. Bibliography included.
- IC 7348. European Shale-Treating Practice, by William W. Odell and E. L. Baldeschwieler. 1946. 70 pp., 22 figs. Describes studies made in Europe and other foreign countries in production of motor fuel and lubricating oil from oil shale.
- IC 7350. Inspection Standards for Strip Mines (Coal and Lignite), Revised October 1945. 1946. 32 pp. Inspection standards for strip mines producing bituminous coal, anthracite, and lignite, prepared by Bureau for use by mine officials and employees and by Federal coal-mine inspectors working under provisions of the Federal Coal-Mine Inspection Act. The 271 tentative standards are divided into 9 major phases and can be consulted for determining which practices are considered hazardous.
- †IC 7351. Wetting-Agent Concentration in a Water Solution Determined by the Drop-Number Method, by John P. Harmon. 1946. 6 pp., 5 figs. Bureau of Mines tests have shown that a chemical laboratory instrument known as Traube's stalagmometer can be used for accurately determining concentration of a wetting agent in solution. Determinations can be made quickly by a person not especially trained in laboratory technique. Organic chemicals known as wetting agents and used for dust-control work reduce the surface tension of water when mixed with it in very dilute solutions.
- IC 7352. Annual Report of Research and Technologic Work on Coal, Fiscal Year 1945, by A. C. Fieldner and F. E. Brewer. 1946. 103 pp., 23 figs. Accomplishments of Bureau engineers and scientists in the field of coal research and technology, including occurrence and properties, explorations, mining practices, dust and gaseous explosions, coal preparation, stor-

†Out of print.



- age, and utilization, carbonization, gasification, and liquefaction are reviewed; covers period from July 1, 1944, to June 30, 1945.
- IC 7353. A Plan for Training Mine Officials in Rescue Organization and Disaster Prevention, by E. R. Maize and J. V. Berry. 1946. 13 pp., 8 figs. Training mine officials by showing them how to organize rescue and recovery activities and thus avoid panic at coal- and metal-mine disasters is recommended by Bureau of Mines as part of its Nation-wide accident-prevention program. Circular is based on a protective system maintained at Industrial Collieries Corp. at Johnstown, Pa. Accessories and equipment needed to combat a mine fire or explosion are listed as they are provided by the large coal corporation, and complete details of duties, organization, and equipment are included.
- IC 7354. Sinking Large-Diameter Drill Holes, Lake Superior District Underground Iron Mines, by Ernest W. Johnson and Frank E. Cash. 1946. 21 pp., 19 figs. Describes two relatively new and unique methods of sinking large-diameter shafts into deep underground workings in iron mines, developed and used successfully by iron-ore-producing companies in the Lake Superior mining district. Operators in Lake Superior district began experimenting on these types of shafts in 1938 and continued during war years. Includes problems encountered in shaft sinking in Minnesota, Wisconsin, and Michigan and drilling logs, drawings, and photographs of drilling equipment.
- †IC 7356. Explosives-Handling Practices at the Mines of the Anaconda Copper Mining Co. at Butte, Mont., by Edward F. Courtney and John A. Johnson. 1946. 13 pp., 8 figs. Effective explosives-handling practices employed at mines of the Anaconda Copper Mining Co. are cited as worthy of study in preventing severe and costly explosives accidents at other mines. Transportation and storage of explosives, methods of drilling rounds, preparation of primers used in blasting, electric blasting, and safe handling of mis-fired shots are discussed. A copy of the company safety rules concerning transportation, handling, and use of explosives also is presented.
- IC 7357. Extraction and Uses of Beryllium in Germany, by George T. Motock. 1946. 12 pp., 1 fig. Describes recent German technological advances in extraction and utilization of beryllium, a metal often employed as an alloying element in making precision instruments, based on a survey of the German beryllium industry, which was undertaken in 1945 at direction of Technical Industrial Intelligence Committee Subcommittee on Metals and Minerals. Bureau of Mines is a member of the committee, which functions under Joint Intelligence Committee of Joint Chiefs of Staff of United States Armed Forces. Numerous descriptions of current German techniques for producing various beryllium salts are presented.
- IC 7358. Report of Petroleum and Natural-Gas Division, Fiscal Year 1944, by R. A. Cattell, H. P. Wheeler, Jr., and others. 1946. 29 pp., 11 figs. Describes the work of the Petroleum and Natural-Gas Division for fiscal year 1944, including research on petroleum chemistry and refining; primary extraction of oil and gas, secondary recovery of oil, and production of helium are discussed. Lists publications prepared by division issued during the period.
- IC 7359. Coal-Mine Explosions and Coal- and Metal-Mine Fires in the United States During the Fiscal Year Ended June 30, 1945, by D. Harrington, W. J. Fene, and H. B. Humphrey. 1946. 22 pp., 1 fig. Although number of fatalities from mine explosions for the fiscal year 1945 dropped below that of preceding year, number of reported explosions increased. Safety measures for preventing mine fires and explosions are discussed.
- †IC 7360. Cement in Latin America, by Oliver Bowles and A. Taeyes. 1946. 51 pp. Reviews current developments in rapidly expanding cement industry of Latin America, supplementing previously published information. Latest data on availability of raw materials, description of plants, plant capacity, production, and consumption for a period of years, and per capita consumption are presented. Cement imports and exports, fluctuations in sources of supply, as well as degree of self-sufficiency of each Latin American country, are also discussed. Argentina is largest Latin American producer of cement at present, followed by Brazil and Mexico. See also IC 7102.
- †IC 7361. Extraction and Uses of Lithium in Germany, by George T. Motock. 1946. 23 pp., 1 fig. Describes recent German technologic advances in extraction and uses of lithium, a metal used as an alloying and purifying element added to nonferrous metals. Data were obtained for Technical Industrial Intelligence Committee Subcommittee on Metals and Minerals in 1945 in Germany.
- IC 7362. The German Steel Castings Industry, by Charles W. Briggs and Max T. Ganzauge. 1946. 105 pp. Steel foundries of Germany were investigated to ascertain type and classification of steel structures produced as castings, processing methods, the mechanical properties of carbon and alloy cast steels, type and character of defective castings, appearance of castings, research in steel castings, and plant layout and equipment. Investigation was undertaken in 1945 for Technical Industrial Intelligence Committee Subcommittee on Metals and Minerals, which functioned under Joint Intelligence Committee of Joint Chiefs of Staff of United States Armed Forces.
- †IC 7363. Boron in Iron and Steel, by R. S. Dean and B. Silkes. 1946. 56 pp., 15 figs. Summarizes numerous world-wide studies by scientists to prove beneficial effects of boron on iron and steel. Includes bibliography.
- IC 7364. Perlite, Source of Synthetic Pumice, by Oliver C. Ralston. 1946. 11 pp. Perlite, a rock formerly regarded as of little industrial value, may play an important role in meeting critical postwar requirements for durable, lightweight building and insulating materials. It resembles pumice in petrologic structure and is a siliceous, volcanic glass containing water of constitution which on quick heating yields an expanded product. Because of its lightness, durability, and superior heat- and moisture-resistance properties, expanded perlite has been utilized in increasing quantities on the Pacific coast in such important uses as lightweight concrete aggregates, thermal and sound insulation, refractory brick, and ceramics. Bibliography included.
- IC 7365. Safety Record of Mine No. 7, Island Creek Coal Co., Holden, Logan County, W. Va., by Alex U. Miller and C. E. Linkous. 1946. 8 pp. Reviews a decade of outstanding safety performance at Island Creek Coal Co. Summary of effective safety practices contributing to the safety record of the mine is presented. Methods of mining and timbering, explosives and detonators, ventilation and mine gases, control of coal dust, haulage, electricity, safeguards for mechanical equipment, and underground fire prevention and control are discussed.
- †IC 7366. Review of Fischer-Tropsch and Related Processes for Synthetic Liquid Fuel Production, by Norma Golumbic. 1946. 24 pp., 4 figs. Discusses mechanism of Fischer-Tropsch process and describes production of synthesis gas and manufacture of catalyst.
- IC 7367. Coal-Research Activities of the Bureau of Mines, by Arno O. Fieldner. 1946. 14 pp. Briefly re-

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views some high lights of Bureau of Mines program of coal research and technologic investigations in the United States. Emphasis in Bureau work is on conservation of our fuel resources by reduction of wastes and more efficient utilization.

IC 7368. **Manufacture and Regeneration of Catalysts at I. G. Farbenindustrie A. G. Plants, Ludwigshafen-Oppau, Germany**, by W. F. Faragher and W. A. Horne. 1946. 6 pp., 4 figs. Principal equipment in catalyst plants at Ludwigshafen-Oppau was inspected and is described in flow sheets for manufacture of four principal catalysts. Five additional catalysts are also described. Report is one of a series that resulted from the investigations in Germany and other parts of Europe by Technical Oil Mission, operating under auspices of Ministry of Fuel and Power for Great Britain and Petroleum Administration for War and Bureau of Mines for the United States.

IC 7369. **Report on the Investigation by Fuels and Lubricants Teams at the Wintershall A. G., Lützkendorf, near Mülheim, Germany**, reported by H. Hollings. 1946. 21 pp., 6 figs. Describes an investigation at the Wintershall A. G., Lützkendorf, near Mülheim, Germany, including Schmalfeldt gasification plant for making synthesis gas, Fischer-Tropsch plant, and hydrogenation plant and catalyst factory. Discussion on lubricating oil is given. Investigation made by Technical Oil Mission.

IC 7370. **Report on the Investigation by Fuels and Lubricants Teams at the I. G. Farbenindustrie A. G. Leuna Works, Merseburg, Germany**, edited by R. Holroyd. 1946. 135 pp., 48 figs. Leuna factory, producing a very wide range of products based on hydrogen or hydrogen and carbon monoxide, was largest heavy-chemical plant in Germany. Gas production, ammonia synthesis, methanol and high-alcohol synthesis, hydrogenation of coal, synthetic lubricating-oil manufacture, and aviation-fuel manufacture and engine testing are discussed. Investigation made by Technical Oil Mission.

†IC 7371. **Tripoli**, by Robert W. Metcalf. 1946. 25 pp. Tripoli is used to designate a number of more or less similar types of silica of sedimentary origin. Physical and chemical properties and mining of tripoli are described, and occurrence, uses, marketing, exports, and foreign deposits are discussed. Bibliography and tables showing production, prices, and imports included.

IC 7372. **Electric Blasting Switches, Underground Mines, Lake Superior District**, by Max S. Petersen and Frank E. Cash. 1946. 11 pp., 7 figs. Incorporating many new safety features devised to eliminate accidents involving explosives, describes six electric-blasting switch assemblies now in use in three Lake Superior iron-ore mines. Photographs, diagrams, descriptions of switch assemblies, instructions for safe operation, and résumé of blasting procedures employed are included, and relative advantages of each of the switch assemblies are compared.

†IC 7373. **Reconversion Problems in Lead Metallurgy**, by G. L. Oldright. 1946. 4 pp. Shows latest methods of concentrating lead and zinc ores; discusses recent progress in separating lead and copper, highly successful lead refinery at Port Pirie, South Australia, and manufacture of metallic zinc from electric slag-treatment furnace.

IC 7374. **Some Data About Fire-Fighting Facilities at Metal Mines in the United States**, by D. O. Kennedy. 1946. 9 pp. Summarizes information about fire hazards encountered in mineral industry. Fire-prevention measures, water supply for fire fighting, first aid, fire-fighting equipment, care of fire-fighting equipment, training of employees, and relationship between surface and underground fires are discussed.

IC 7375. **Report on Investigations by Fuels and Lubricants Teams at the I. G. Farbenindustrie A. G. Works, Ludwigshafen and Oppau**, edited by R. Holroyd. 1946. 75 pp., 32 figs. Information on investigations by fuels and lubricants teams at I. G. Farbenindustrie A. G. works, Ludwigshafen and Oppau, was compiled in March, April, and May 1945. Ludwigshafen factory was a general organic chemical works specializing in dyes, dye intermediates, plastics, and synthetic rubber, and Oppau plant was a heavy organic chemical factory producing ammonia, methanol, higher alcohols, and their derivatives. Report is one of a series that resulted from investigations in Germany and other parts of Europe by Technical Oil Mission, operating under auspices of Ministry of Fuel and Power for Great Britain and Petroleum Administration for War and Bureau of Mines for the United States. (See also IC 7376.)

IC 7376. **Interrogation of Dr. Pier and Staff, I. G. Farbenindustrie A. G., Ludwigshafen and Oppau. Supplement II. Report on Investigations by the Fuels and Lubricants Teams**, reported by W. F. Faragher and W. A. Horne. 1946. 27 pp., 9 figs. Because of desire for further information on a miscellany of products and processes of interest to the petroleum industry, Dr. Mathias Pier and his staff were interrogated further in July 1945. Information in this report supplements that previously reported in IC 7375, Report on investigations by fuels and lubricants teams at the I. G. Farbenindustrie A. G. works, Ludwigshafen and Oppau. This report is one of series that resulted from investigations by Technical Oil Mission.

†IC 7377. **Design and Operation of the Coal Planer, Ruhr District, Germany**, by John W. Buch. 1946. 20 pp., 34 figs. Describes design and operation of German Kohlenhobel, or coal planer, one of outstanding wartime developments in mechanical mining-equipment field. One of a series of reports written by members of Solid Fuels Mission to Germany, organized early in 1945 under auspices of Technical Industrial Intelligence Committee, which cooperated with a counterpart British committee.

IC 7378. **Operating Diesel Locomotives Underground in European Mines**, by J. H. East, Jr. 1946. 13 pp. A discussion on Diesel locomotives working underground in coal and metal mines of several European countries and a brief description of mining conditions observed where Diesel locomotives are used.

IC 7379. **Alaska's Minerals as a Basis for Industry**, by H. Foster Bain. 1946. 89 pp., 4 figs. During 80 years of United States possession, Territory of Alaska has added nearly 2 billion dollars' worth of mineral and nonmineral products to national wealth and still contains vast unexploited mineral resources. Bureau of Mines exploratory work has disclosed presence of many metals and nonmetallic minerals; but, with exception of gold, copper, coal, and certain other minerals, considerable prospecting must be completed to determine the economic value of such deposits. In addition to histories of gold, copper, and coal mining, survey discusses available data on lead and zinc, iron ores, potential petroleum, mercury, tin, antimony, tungsten, molybdenum, chromite, nickel, and platinum metals. Nonmetallic minerals considered include asbestos, barite, clays, fluorspar, garnet, gypsum, limestone and marble, sand and gravel, jade, and sulfur.

IC 7380. **Safe Storage, Handling, and Use of Commercial Explosives in Metal Mines, Nonmetallic Mines, and Quarries**, by D. Harrington and J. H. East, Jr. 1946. 30 pp., 12 figs. Discusses characteristics of ordinary types of explosives used in industry and outlines safe practices expected to help make stor-

†Out of print.

- age, handling, and use of explosives less hazardous to persons and property.
- IC 7381. *Metallic Titanium and Its Alloys*, by R. S. Dean and B. Silkes. 1946. 38 pp., 6 figs. Describes various alloys of titanium with iron, copper, nickel, aluminum, zinc, and zirconium. Extensive bibliography included.
- †IC 7382. *Treatment of Acid Mine Water for Breaker Use in the Anthracite Region of Pennsylvania*, by L. H. Johnson. 1946. 14 pp., 10 figs. Describes latest methods of protecting valuable processing equipment from corrosive action of acid mine water used in preparing coal in Pennsylvania anthracite region.
- IC 7383. *Summarized Statistics of Production of Lead and Zinc in the Tri-State (Missouri-Kansas-Oklahoma) Mining District*, by A. J. Martin. 1946. 67 pp., 9 figs., 6 graphs. Tri-State district of Missouri, Kansas, and Oklahoma produced 20,755,020 tons of zinc concentrates and 3,334,057 tons of lead concentrates valued at \$1,110,058,581 during past century. Detailed production records by district, technical data, and a bibliography are included.
- IC 7385. *Description of Typical Mine-Telephone Systems and Suggestions for Making Improved Installations*, by C. L. Brown. 1946. 17 pp. Describes telephone systems used at four western Pennsylvania coal mines and discusses methods of installation whereby communication systems are less likely to be rendered inoperative after mine fires and explosions. Advantages and disadvantages of each system of communication are given.
- IC 7387. *Some Safety Practices for Metal Mines, Non-metal Mines (Other Than Coal), Mills, Metallurgical Plants, and Quarries*. 1946. 56 pp. Best safety practices of Nation's mineral industry, summarized in this publication, were compiled from State mining regulations, company safety rules, and experience of Bureau engineers over more than three decades. Numerous safety suggestions relating to operation of mills and metallurgical plants, open pits, quarries, hoists, mine cages and shafts, and the maintenance of change, supply, and lamp houses are given, and standards for minimizing hazards associated with hand-loading operations, surface and underground haulage, transportation and storage of explosives, and installation of electrical and mechanical equipment are listed. Supervisory personnel and practices, establishment of employee-official safety organizations, and inauguration of first-aid and mine rescue training programs are also covered.
- IC 7388. *Home Insulation with Mineral Products—Conserves Fuel, Reduces Cost, Increases Comfort*, by Oliver Bowles. 1946. 11 pp. Nearly a billion dollars and vast quantities of fuel could be saved each year by applying known heat-conservation measures to existing dwellings in United States. Use of mineral products in home insulation and effect of insulation upon three modes of heat transfer—conduction, convection, and radiation—are described, and detailed data on thermal conductivity of various insulating materials are included.
- †IC 7389. *Coal-Preparation Practice in Western Germany*, by Thomas Fraser and M. G. Driessen. 1946. 70 pp., 33 figs. Describes coal-preparation practices in western Germany. Information on technological or organizational developments unknown to American coal industry, discovery of any new devices or techniques for preparing special grades of coal for emergency war needs, and techniques of German methods of preparing coal for conversion to liquid fuels were objectives of study. Intensive coal-purifying ash minerals, and tar-oil extraction of coal matter. An appendix on supervision of German coal-preparation plants, numerous drawings of German equipment, and considerable detailed technical data are included. Report is one of a series written by members of the Solid Fuels Mission to Germany, organized early in 1945 under auspices of Technical Industrial Intelligence Committee, which cooperated with a counterpart British committee.
- IC 7390. *Description of the Bickhoff-Schrämmlader Longwall Coal-Cutting and Loading Machine*, by Einar M. Arentzen. 1946. 5 pp., 7 figs. Describes the construction details and operating features of a new-type German longwall coal-cutting and loading machine. During a 3-month period, this equipment produced more than 33,000 tons of coal in Jacobi mine, Germany.
- †IC 7391. *Determination of the Size of Submicroscopic Particles by X-Rays*, by A. Guinier, translated from the *Jour. Chim. Phys.*, 40, 133, 1943, by Ruth F. Brinkley and Stuart R. Brinkley, Jr. 1946. 17 pp., 14 figs. Describes experimental methods, summarizes calculations needed in elaboration of diagrams, and reviews first results obtained in vast domain of these new physical-chemical studies.
- IC 7392. *A Mine Sewage-Disposal Study*, by R. T. Artz. 1946. 8 pp., 2 figs. Discusses underground sewage-disposal methods and precautions to be exercised in installation and operation. Detailed information and drawings are included on a sewage-disposal system in use at limestone mine of Columbia Chemical Division, Pittsburgh Plate Glass Co., at Barberton, Ohio.
- †IC 7393. *Diamond-Drilling Blast Holes, Eastern Magnetite Mine A*, by McHenry Mosier. 1946. 8 pp. Describes diamond-drilling techniques employed in preparing blast holes at a large eastern magnetite development. Detailed descriptions of apparatus employed as well as a summary of results obtained by diamond and percussion drilling are given.
- IC 7394. *Diamond-Drill-Core Storage at Mount Weather Testing Adit*, by James E. Hill. 1947. 3 pp., 8 figs. Diamond-drill cores from 23 projects in 11 States are stored at Mount Weather. The cores provide permanent tangible records of diamond-drilling explorations for strategic and critical minerals carried on by Bureau in the eastern United States.
- IC 7395. *Low-Temperature Coke by the Krupp-Lurgi Process*, by L. D. Schmidt. 1947. 18 pp., 9 figs. Describes a German-developed process for making low-temperature coke. A comparison of investment and operating costs for high-temperature coking and low-temperature coking by the Krupp-Lurgi process, with construction details of equipment used in the latter method, is given. Report is one of a series written by members of Solid Fuels Mission to Germany, organized early in 1945 under auspices of Technical Industrial Intelligence Committee, which cooperated with a counterpart British committee.
- IC 7396. *Information on Coal Mining in Spain*, by J. H. East, Jr. 1947. 27 pp., 6 figs. Discusses coal mining in Spain. Bituminous-coal, anthracite, and lignite deposits are found in several Provinces, but largest and best coal fields are in northern Provinces near Bay of Biscay. Asturias bituminous-coal field and Puertollano coal district are described.
- IC 7397. *What is Coal?* by Reinhardt Thiessen. 1947. 58 pp., 11 plates. This paper, presented 10 years ago at a meeting of Appalachian Coals, Inc., reviews formation of coal and describes various types. Thin sections of coals of all ranks are given to show changes that take place with age.
- IC 7398. *Some Results of Inspections of Explosives-Storage Facilities Under the Federal Explosives Act*, by P. R. Moyer. 1947. 60 pp. Compilation of results obtained during period of active enforcement of explosives-storage provisions set out in regulations issued under Federal Explosives Act. More than 47,500 inspections and reinspections were made on approximately 25,800 storages of explosives.

†Out of print.

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- IC 7399. Natural-Gasoline and Cycle Plants in the United States, January 1, 1946, by F. S. Lott and E. M. Seeley. 1947. 18 pp. Presents figures on the daily output of natural-gasoline and cycle plants in the various States and also provides names of individual producers, and location, status, and types of plants operated by each company.
- IC 7401. Diamond-Drilling Blast Holes, Eastern Magnetite Mine B, by McHenry Mosier. 1947. 8 pp., 2 figs. Describes successful use of diamond drills in the preparation of blast holes at a large eastern magnetite development, and discusses relative merits of this method as compared with percussion drilling. Detailed descriptions of apparatus employed, as well as summary of results obtained by diamond and percussion drilling, are given.
- IC 7402. Industrial Uses of Limestone and Dolomite, by Oliver Bowles and Nan C. Jensen. 1947. 19 pp. Discusses industrial uses and trends for limestone and dolomite—economically important minerals now employed in more than a score of chemical and processing applications. During 1945 chemical and processing industries absorbed 49,800,000 tons of limestone—approximately one-third of total domestic production. The 1945 metallurgical requirements for lime and limestone as fluxing material in blast furnaces and open-hearth and electric steel plants totaled 30,524,920 tons. Consumption of dolomite for all uses during 1945 totaled more than 3,740,000 tons. (See also IC 7169.)
- IC 7403. Recent Engineering Developments in Switzerland on Gas Turbines and Steam Generators, by Harold J. Rose. 1947. 38 pp. Economic situation in Switzerland in recent years has resulted in theoretical studies, engineering development work, and many commercial installations of ingenious methods for using energy more efficiently. Purpose of investigation was to learn of Swiss developments for more effective use of coal, including types of gas turbines and compact steam generators in use.
- IC 7404. Ventilation Involved in the Use of Gasoline-Powered Equipment in Enclosed Spaces (Not in Mines or Tunnels), by L. B. Berger. 1947. 8 pp., 4 figs. Presents data that may be used in estimating rate of ventilation required in enclosed spaces where hazard from carbon monoxide may be created by use of mobile equipment powered by gasoline engines.
- IC 7405. Potash Mining in Germany, 1945, by J. H. East, Jr. 1947. 15 pp., 10 figs. Containing some of world's largest known deposits of potash—essential component of many commercial fertilizers—Germany produced nearly two-thirds of world's total output of processed salts prior to World War II. Largest potash-producing centers are Werra-Fulda and Sud Harz districts in Hessen and Thüringen Provinces of central Germany. Descriptions of processing plants and mining techniques employed in these districts are given. Latest figures on potash production in Germany between 1936 and 1944 are presented, and major potash mines according to zones of occupation are listed. Discusses German back-filling methods.
- IC 7406. Diesel Equipment in Underground Mining, by D. Harrington and J. H. East, Jr. 1947. 87 pp., 13 figs. Provides information as to successful use of Diesel-powered equipment in some underground workings in United States and Europe, and briefly discusses characteristics of some of toxic gases found in exhaust of Diesel engines.
- IC 7407. Installation of a Model Man Cage at the Avoca Shaft of the Heidelberg Coal Co., Avoca, Luzerne County, Pa., by E. H. McCleary and Joseph V. Mather. 1947. 5 pp., 17 figs. Demonstrates how safe transportation has been provided for workmen in this shaft. Outstanding safety features are: Cage cannot be overwound; cage stops automatically at each landing; doors leading to shaft cannot be opened, except when cage is at level of door; operator is provided for cage; telephone and electric lights are provided for cage; overspeed stop controls and safety catches are installed; and possibility of falling from cage is virtually absent.
- IC 7408. Diamond-Drilling Blast Holes, Balmat Mine, St. Lawrence County, N. Y., by McHenry Mosier. 1947. 6 pp., 1 fig. Principal advantage of diamond-drilling blast holes at Balmat zinc mine is extraction in a safe manner of ore not minable by short-hole drilling. Principal disadvantage is greater cost per foot of hole in comparison with percussion drilling. Mine is owned and operated by St. Joseph Lead Co.
- †IC 7409. German High-Temperature Coal-Tar Industry, by E. O. Rhodes. 1947. 117 pp., 8 figs. Describes German technical advances before and during World War II in manufacture of synthetic materials from byproducts of high-temperature carbonization of caking bituminous coal. One of a series written by members of Solid Fuels Mission to Germany, organized early in 1945 under auspices of Technical Industrial Intelligence Committee, which cooperated with a counterpart British committee.
- IC 7410. Accident Experience, Iron-Ore Mines—Lake Superior District, 1940-45, by Frank E. Cash. 1947. 11 pp. Accident experience in Lake Superior district iron-ore ranges (Marquette, Menominee, Gogebic, Cuyuna, Mesabi, and Vermilion) in Michigan, Minnesota, and Wisconsin is better than that of remainder of country; these mines produced 85 percent of iron ore mined in United States. However, injuries in the district, although relatively fewer and less severe than in other metal-mining districts, increased in frequency during 5 years of the 6-year period.
- IC 7411. Peat-Bog Fires—Their Origin and Control, by D. J. Parker, J. E. Benson, F. E. Cash, and J. H. Bird. 1947. 12 pp., 7 figs. Florida is only State maintaining permanent well-equipped and adequately manned fire-fighting stations for preventing and controlling peat-bog or muck-soil fires. Origin of peat-bog fires in California, Florida, Michigan, Minnesota, and Wisconsin is probably similar, smoking perhaps being commonest cause. Burning fields of dry grass and kindling outdoor fires for warmth also cause frequent ignitions of peat-bearing soil. Ditching is not practiced in Florida, but application of water under high pressure as a fog has been unusually effective.
- IC 7412. Quantitative Estimation of Potash and Soda Feldspars in Pegmatite Rock by Means of Chemical Coloration; a Review of Selected Literature, by Gerald A. Munson and E. P. Barrett. 1947. 5 pp. Gives summaries of methods developed by various investigators for determination of feldspars in pegmatites. Researchers cited include Johannsen and Merritt, Engel, Gabriel and Cox, Russell, and Kruger. Cobaltinitrite staining method employed by Bureau of Mines at Rapid City, S. Dak., is described.
- †IC 7413. Approval of Newly Developed Self-Contained Breathing Apparatus, Instructions in Its Care and Use, and Training Procedure, by G. W. Grove and E. E. Quenon. 1947. 18 pp. Apparatus recently approved by Bureau of Mines and discussed are as follows: Chemox self-contained oxygen breathing apparatus made by Mine Safety Appliances Co.; Scott Air-Pak self-contained breathing apparatus, made by Scott Aviation Corp.; M. S. A. demand-type oxygen mask, half-hour self-contained breathing apparatus, made by Mine Safety Appliances Co.; and M. S. A. demand-type compressed-air mask, half-hour self-contained breathing apparatus, also made by Mine Safety Appliances Co. These appara-

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- tus are described, and instructions are given for their care and use.
- IC 7414. Geophysical Abstracts 127, October-December 1946, with an Index to Abstracts 124-127, compiled by V. L. Skitsky. 1947. 86 pp. Usual quarterly compilation of articles collated from domestic and foreign press on gravitational, magnetic, seismic, electrical, radioactive, geothermal, and geochemical prospecting methods. Patents are also included. Succeeding numbers of Geophysical Abstracts will be issued by Geological Survey and may be purchased from Superintendent of Documents at United States Government Printing Office. They will be listed in Geological Survey lists of publications, issued monthly. See index under "Geophysical abstracts" for complete list of information circulars in this series.
- IC 7415. Gasification of Solid Fuels in Germany by the Lurgi, Winkler, and Leuna Slagging-Type Gas-Producer Processes, by William W. Odell. 1947. 48 pp., 12 figs. Discusses three gas-making processes that were developed and put into commercial operation in Germany. They are Lurgi pressure gasification process, Winkler generator and gasification process, and Leuna slagging-type producer-gas process.
- †IC 7416. Limestone as Building Material, by Oliver Bowles and Nan C. Jensen. 1947. 16 pp. Discusses varieties of limestone produced in United States, types of products made from stone, centers of production, and economic conditions. Other sections deal with quarrying and milling methods and marketing of limestone.
- IC 7417. Annual Report of Research and Technologic Work on Coal, Fiscal Year 1946, by A. C. Fieldner and P. M. Ambrose. 1947. 142 pp., 31 figs. Contains references to most of published articles containing results of Bureau's war investigations on coal and coal products. Covering period from close of war to resumption of normal coal research, includes for first time a discussion of Bureau's activities in Liquid Fuels and Lubricants and Solid Fuels Subcommittees of Technical Industrial Intelligence Committee. Material presented is based largely on publications; but results of some research and testing, which otherwise would not be published in near future, are presented in detail.
- IC 7418. Procedure Used in Fighting and Sealing a Fire in an Ohio Coal Mine and Recovery of the Mine by Air-Locking Methods, by G. W. Grove, F. E. Griffith, and H. R. Burdelsky. 1947. 18 pp., 6 figs. Describes how a coal mine—sealed following a fire—was safely and effectively reopened by erecting a chain of air locks to fire area. Air locking is defined as a method by which entrance can be made into an area of a mine from which normal atmospheric air is excluded by airtight seals with doors in each seal to form an air lock for ingress and egress.
- IC 7419. Transportation of Iron Ore, Underground Mines, Lake Superior District, by John A. Johnson and Frank E. Cash. 1947. 22 pp., 11 figs. Describes transportation of iron ore in Lake Superior district covering movement of ore from active areas to surface, underground haulage, shaft stations and hoisting shafts, skips, cages and hoists, head frames, and stock-pile haulage. Photographs and descriptions of equipment discussed are included.
- IC 7420. Pott-Broche Coal-Extraction Process and Plant of Ruhröl G. m. b. H., Bottrop-Welheim, Germany, by H. H. Lowry and H. J. Rose. 1947. 12 pp., 8 figs. Describes a German process for a coal extract which can be coked and used in manufacture of high-grade electrode carbon of exceptionally low ash content. Includes a flow sheet and numerous photographs of equipment used in Pott-Broche coal-extraction plant at Bottrop-Welheim in Ruhr district. One of a series written by members of Solid Fuels Mission to Germany, organized early in 1945 under auspices of Technical Industrial Intelligence Committee.
- IC 7421. Use of Rock Dust and Water Under the Federal Mine Safety Code in Limiting Coal-Dust Explosions, by J. J. Forbes and C. W. Owings. 1947. 12 pp. Widespread explosions in coal mines can be prevented if rock dust of suitable size and composition is applied effectively within two or three cuts of face; distance between end of rock dusting and face should never exceed 80 feet. Water should be used on cutter bar of mining machines, and coal piles should not only be wetted after blasting but kept wet during loading.
- IC 7422. Some Observations on German Coal Research and Developments, by H. H. Lowry and H. J. Rose. 1947. 27 pp., 8 figs. Describes German coal research and fuel technology developments observed by members of an American mission in six laboratories of the Reich shortly after World War II. One of a series of reports written by members of Solid Fuels Mission in Germany, organized early in 1945 under auspices of Technical Industrial Intelligence Committee, which cooperated with a counterpart British committee.
- IC 7423. Wash and Change Houses at American Mines, by D. Harrington and J. H. East, Jr. 1947. 44 pp., 30 figs. Summarizes State laws on wash and change houses, some of which include detailed specifications and suggests proper location and construction, heating and ventilation, and arrangement of facilities. Contains detailed descriptions and floor plans of wash and change houses of various sizes, including a list of desirable features, and is illustrated with photographs and diagrams designed to assist management in providing or modernizing such facilities.
- IC 7424. An Easily Constructed Optical Bench, by Graham W. Marks, Frank Cassey, and Ralph Mills. 1948. 2 pp., 2 figs. Describes an optical bench and lens holder used to determine the focal length of lenses or the performance of lens systems; it has been designed and constructed so that one or more lenses can be mounted easily and their positions relative to a light source and screen changed readily.
- IC 7425. Methods and Costs of Sinking the Silver Summit Shaft, Wallace, Idaho, Using a Mechanical Mucking Machine, by George M. Grismer and Robert J. Hundhausen. 1948. 12 pp., 4 figs. Describes the methods and costs of deepening the Silver Summit 3-compartment shaft in the Coeur d'Alene mining region of Idaho, using a mechanical shaft-mucking machine.
- IC 7426. Methods and Costs of Sinking a 2½-Compartment Shaft at the Hope Mine, Clark Fork, Idaho, by Robert J. Hundhausen. 1948. 13 pp., 4 figs. Describes methods and costs of sinking a 2½-compartment shaft at the Hope mine, Clark Fork, Idaho.
- IC 7427. Use of Western Magnetite as Ship Ballast, by C. L. Severy. 1948. 3 pp. Describes a new use for western magnetites. Magnetite, mixed as an aggregate in concrete, is an efficient ship's ballast. Furthermore, it costs less than pig-iron ingots and steel scrap ordinarily used for this purpose.
- IC 7428. Mining and Milling Methods and Costs at the Little Pittsburg Lead-Zinc Mine, Shoshone County, Idaho, by Robert J. Hundhausen. 1948. 21 pp., 6 figs. Mining and milling methods at the Little Pittsburg mine are described. Mining and milling costs in units of labor, power, and supplies for the 7-month period covered in this report are included.
- †IC 7429. Diamond-Drilling Blast Holes, Bell Mine, The Warner Co., Centre County, Pa., by McHenry Mosier. 1948. 6 pp., 1 fig. Diamond-drilling blast

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- holes and percussion drilling at the Bell mine are described, with an appraisal of the relative merits of the two types of drilling.
- IC 7430. Low-Temperature Carbonization of Coal in Japan, by William T. Reid. 1948. 82 pp., 22 figs. The operating factors relating to the performance of low-temperature carbonization processes are given in considerable detail, and the extent of the industry in Japan is shown. A brief description of the features of each of the six types of low-temperature carbonization processes in Japan is included. Eight plants in Japan Proper and four plants outside of Japan Proper are described.
- IC 7431. Safety in Blasting at Ajo, Ariz., by Allen D. Look and J. Howard Bird. 1948. 17 pp., 6 figs. The New Cornelia Branch open-pit copper mine, Ajo, Ariz., operated without a fatality in the drilling and blasting operations from December 13, 1937, to April 1, 1947, and continuing. Precautions taken to insure safe handling of explosives at this operation are given.
- IC 7432. Permissible Mine Equipment Approved to January 1, 1947, with Appended List of Available Flame-Lamp Fuels, by A. B. Hooker. 1947. 44 pp. Revision of IC 7207, 7240, 7283, and 7316 and cites additional equipment approved from January 1, 1945, to January 1, 1947. Embracing virtually every type of equipment used in coal mining, the publication also gives the approval dates and the names of manufacturers of equipment certified as safe by the Bureau. Obsolete equipment still in use, but for which repair parts are not currently available, are listed in the appendix. An additional appendix containing trade names and names of producers of seven approved flame-safety lamp fuels and providing information regarding the availability of each of the listed fuels in the various mining areas is also included. (See also IC 7465.)
- IC 7433. Diamond-Drilling Blast Holes, Eastern Magnetite Mine C, by McHenry Mosier. 1948. 7 pp., 3 figs. Diamond-drilling blast holes and percussion drilling at Eastern Magnetite Mine C are described, and the advantages and disadvantages of diamond-drilling blast holes are discussed.
- IC 7434. Outcrop and Underground Mine Fires in Allegheny County, Pa., by G. W. Grove and E. E. Quenon. 1948. 6 pp. Property damage and health hazards resulting from uncontrolled mine fires, burning both in surface outcrops of coal seams and in underground abandoned mines, can be minimized by the adoption of prompt and vigorous counter-measures. Typical examples of active mine fires which have been investigated by the Bureau in Allegheny County, Pa., during the past 5 years are reviewed, and recommendations for combating such fires are presented.
- IC 7435. Mine Man-Trip and Ambulance Cars, by M. J. Mechling and H. J. Sloman. 1948. 6 pp., 12 figs. Detailed information on cars now in underground service for man-trips and for transporting injured persons is given.
- IC 7436. Safety Catches on Mine Cages and Methods of Testing Them, by D. Harrington and J. H. East, Jr., 1948. 43 pp., 18 figs. Describes various cage safety devices now in use, as well as methods of testing safety catches in some eastern bituminous-coal mines and the Lake Superior iron mining district. Summarizes some State laws and discusses falling-cage accidents and some causes of hoisting-rope failure.
- IC 7437. Mining Methods at the Vulcan Iron Mine, San Bernardino County, Calif., by C. L. Severy. 1948. 11 pp., 9 figs. Describes methods used to explore the Vulcan iron mine, the only large-scale open pit mine in California, as well as the development of the mine and its operation, including drilling and blasting, ore handling and treatment, and sampling.
- IC 7438. Diamond-Drilling Blast Holes, Bellefonte Mine, National Gypsum Co., Centre County, Pa., by McHenry Mosier. 1948. 6 pp. One of a series telling about current diamond-drilling blast-hole practices in industry, the publication compares this method with percussion rock-drilling and contains much information of interest to mine operators.
- IC 7439. Burning Refuse Dumps at Coal Mines, by D. Harrington and J. H. East, Jr. 1948. 28 pp. Lists causes of fires at coal-mine refuse dumps and ways of controlling them, with a recommended method of building a dump.
- IC 7440. Sponge Iron in Japan, by Theo. L. Johnston. 1948. 12 pp., 2 figs. Between 1939 and 1945, 11 Japanese plants produced 646,896 metric tons of sponge iron. The 11 plants containing 31 rotary kilns constructed in Japanese territory since 1938 utilized the Krapp-Benn process for making sponge iron from low-grade iron ore and low-grade coal. The operation of the Iwataki plant on the west coast of Honshu, as well as other rotary-kiln plants and plants using batch kilns, ascending kilns, and electric furnaces, are considered.
- IC 7441. Laboratory Equipment for the Analysis of Mine Atmospheres, by L. B. Berger and H. H. Schrenk. 1948. 18 pp., 9 figs. To assist mining companies, State mining departments, and other agencies in the establishment of laboratories for analyzing mine air, this publication discusses the principal types of equipment necessary for this purpose. Most of the major types of equipment required for the analysis of mine atmospheres are listed. Drawings of apparatus discussed in the text and a bibliography are included.
- †IC 7442. Thickness of Bituminous Coal and Lignite Seams Mined in the United States in 1945, by W. H. Young and R. L. Anderson. 1947. 17 pp., 4 figs. Bituminous coal and lignite seams of the United States and Alaska range from less than 2 feet in thickness to more than 50 feet, but the majority of the Nation's coal mines produce from seams 8 to 6 feet thick and the average of the country is 65 inches. Contains information on coal seams of the United States as well as other data on coal production from strip and underground bituminous coal and lignite mines in 1945.
- †IC 7443. Exploration, Development, Mining, and Milling of a Unique Tungsten Ore Body at the Yellow Pine Mine, Stibnite, Idaho, by John W. Cole and H. D. Bailey. 1948. 24 pp., 7 figs. In 1939 and 1940 the Bureau explored the Yellow Pine mine by diamond drilling, disclosing large bodies of comparatively high-grade antimony ore. It was not until February 1941 that scheelite, the tungsten mineral in most domestic ore mined, was recognized in the drill cores by a geologist of the Federal Geological Survey. The value of the tungsten ore recovered in the mine exceeded by many times the value of the combined gold, silver, and antimony recovered. Detailed descriptions of mining and milling methods, costs of diamond drilling and development, and concentrated processes used are included.
- †IC 7444. List of Respiratory Protective Devices Approved by the Bureau of Mines, by H. H. Schrenk. 1948. 14 pp., 13 figs. A revised list of approximately 150 respiratory protective devices officially approved after rigid tests by the Bureau is given. The list includes devices tested up to July 1, 1947. The devices include self-contained breathing apparatus; gas masks; supplied-air respirators, including hose masks, air-line respirators, and abrasive blasting helmets, hoods, or masks; dispersoid (dust, fume, and mist) respirators; and nonemergency gas respirators (chemical cartridge respirators).
- IC 7445. Mining Methods and Practices, Potash Co. of America, Eddy County, N. Mex., by Walter E. Storms. 1948. 18 pp., 13 figs. Describes the mining

†Out of print.

- methods of the Potash Co. of America in the Carlsbad region of New Mexico and is one of a series on mining practices and methods in various mining districts of the United States. Other topics discussed are methods of sampling and estimating tonnages and values, transportation, ventilation, safety measures, current wage scales, and company organization.
- †IC 7446. Annual Report of Research and Technologic Work on Coal, Fiscal Year 1947, by A. C. Fieldner and P. M. Ambrose. 1948. 113 pp., 54 figs. Bureau of Mines, concluding all war research on coal, emphasized improvements in mining, preparation, and utilization of coal and centered special attention on conservation, safety research, coking coal, and synthetic liquid fuels during the fiscal year 1947.
- †IC 7447. Protection Against Lightning at Surface and Underground Mining Plants, by D. Harrington, D. J. Parker, and L. H. Harrison. 1948. 23 pp. In addition to many deaths and injuries, lightning annually causes considerable damage to electrical equipment, fires in surface structures at mines, and accidents in the handling and use of explosives. Preventive measures are suggested to avoid premature explosions and damage to equipment and buildings due to lightning.
- †IC 7448. Mining Methods of the Holden Mine, Howe Sound Co., Chelan Division, Holden, Wash., by R. L. Soderberg. 1948. 27 pp., 24 figs. One of a series dealing with mining methods and costs, the publication describes efficient mining methods employed at the Holden mine of the Howe Sound Co., a copper operation at Holden, Wash. Methods of prospecting and exploration, sampling and estimation of tonnage and values, development work above and below the main haulage level, ore drawing, and underground haulage are included.
- IC 7449. Safety Standards for Anthracite Mines, Revision of I. C. 7282. 1948. 59 pp. A revision of the safety standards used by Federal coal-mine inspectors in periodic examinations of the anthracite mines of eastern Pennsylvania, with results of the Bureau's 33 years of study of the safety problems of one of the Nation's oldest industries. The anthracite standards cover surface structures; miscellaneous surface conditions; timbering; explosives and blasting; ventilation and mine gases; control of dust; transportation; electricity; safeguards for mechanical equipment; underground fire prevention, fire control, and mine disasters; and general safety conditions.
- IC 7450. Consumption of Slab Zinc in the United States by Industries, Grades, and Geographic Division, 1940-45, Including a Summary of Consumption Since 1900, by Alfred L. Ransome. 1948. 30 pp., 7 figs. A vast amount of hitherto unpublished and unavailable data on consumption of slab zinc in the United States, dating back to 1900, is contained in this publication, which shows for the first time significant details on the consumption of this important nonferrous metal during World War II.
- IC 7451. Blast-Hole Diamond Drilling in California Mines, by D. W. Butner. 1948. 11 pp., 4 figs. Results of blast-hole diamond drilling at the Hornet mine, Pine Creek mine, and El Dorado mine, California, are given.
- IC 7452. Blast-Hole Drilling with Diamond Drills at the Tennessee Copper Co. Mines, Ducktown, Tenn., by William A. Beck. 1948. 17 pp., 7 figs. One of a series describing diamond-drilling practices in various mines throughout the United States, the publication compares the relative merits of this method and percussion drilling. Tables summarizing the results obtained by diamond drilling and percussion drilling during a 6-month period extending from January 1 through June 15, 1946, at the Tennessee Copper Co. mines are included.
- IC 7453. Underground Metal-Mine Fires from Cutting and Welding, by Allen D. Look. 1948. 9 pp. Describes 19 typical metal-mine fires in the United States and Canada and also presents a number of recommendations for preventing fires of this type.
- IC 7454. Safe Equipment, Guards, and Practices, Lake Superior District Iron-Ore Mines, by Frank E. Cash and Max S. Petersen. 1948. 98 pp. 181 figs. This illustrated circular describes equipment, guards, and practices that have proved effective in preventing accidents in the iron-ore mines of Lake Superior district. The photographs, made primarily for use in the Metal-Mine Accident-Prevention Course of the Bureau of Mines, are arranged under seven headings—accident statistics; support of ground; hoisting and haulage; explosives; fires, gases, and ventilation; electrical and mechanical installations; and health and miscellaneous. They cover both surface and underground installations and operations. Each is accompanied by explanatory matter.
- IC 7455. Petroleum Refineries, Including Cracking Plants in the United States, January 1, 1947, by F. S. Lott. 1948. 16 pp., 1 fig. Comparable information with respect to crude-oil and cracking capacity on January 1, 1947, is provided. Suspended since 1941, publication of the Bureau's annual surveys of the capacity of petroleum refineries in the United States is resumed.
- IC 7456. Coal-Mine Explosions and Coal- and Metal-Mine Fires in the United States During the Fiscal Year Ended June 30, 1947, by D. Harrington, W. J. Fene, and H. B. Humphrey. 1948. 21 pp., 1 fig. Discusses causes of explosions; explosion fatalities, by causes; causes of explosions of electrical origin; comparison of lighting in mines where explosions occurred; explosions in bituminous-coal mines; and mine fires.
- IC 7457. Interpretation of Permissible Limits in the Breathing of Toxic Substances in Air, by H. H. Schrenk. 1948. 7 pp. Discusses factors to be considered by safety officials in applying current permissibility tables and reviews the history of such standards.
- IC 7458. Transportation of Iron Ore, Open-Cut Mines, Lake Superior District, by John A. Johnson and Frank E. Cash. 1948. 24 pp., 16 figs. Discusses briefly and makes available to the mining industry the modern methods, equipment, and safety practices used in transporting iron ore at the open-cut mines of the district.
- IC 7459. Support of Ground, Iron-Ore Mines, Lake Superior District, by Max S. Petersen and Frank E. Cash. 1948. 29 pp., 21 figs. Describes methods of preventing underground cave-ins and reducing this type of accident in iron mines of the Lake Superior district.
- †IC 7460. Psychological Aspects of Accident Prevention, by H. J. Sioman. 1948. 10 pp. Discusses the value of psychological aids in enlisting the full cooperation of employees in accident prevention.
- IC 7461. Control of Roof and Prevention of Accidents from Falls of Rock and Coal, by J. J. Forbes and H. J. Sioman. 1948. 8 pp. First of a series dealing with the control of roof and the prevention of accidents from falls of rock and coal designed to focus attention of the coal-mining industry on this problem. (See also IC 7471.)
- IC 7462. Some Observations on Coking Practice in Germany. Part I. Metallurgical Coke. Part II. Slanting-Type Didier Coke Ovens, Städtische Werke Karlsruhe, by Frank H. Reed, 1948. 74 pp., 19 figs. This publication, written by members of the Solid Fuels Mission to Germany, organized early in 1945 under auspices of Technical Industrial Intelligence Committee, which cooperated with a counterpart British committee, presents a comprehensive sur-

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- vey of the latest German coking practices and equipment. Part I consists of three technical papers covering virtually every aspect of the production of metallurgical coke in wartime Germany. Part II describes the actual operation of slanting-type Didier coke ovens. Bibliography included.
- †IC 7463. Ammonium Nitrate: Its Properties and Fire and Explosion Hazards (a Review with Bibliography), by G. S. Scott and R. L. Grant. 1948. 32 pp., 4 figs. Presents a brief summary and bibliography of the published experimental facts about the properties and behavior of ammonium nitrate and includes a survey of ammonium nitrate fertilizer of the type involved in the explosions on April 16 and 17, 1947, at Texas City, Tex.
- IC 7464. Anodic Deposition of Manganese Dioxide, by Peter Marx, translated by O. C. Ralston. 1948. 9 pp. This publication, a translation of an internal company report filed at the Bitterfeld, Germany, office of the I. G. Farbenindustrie A. G., in 1933, describes an American process for making an acceptable grade of manganese dioxide electrically from solutions of manganese sulfate.
- †IC 7465. Permissible Mine Equipment Approved During the Calendar Year 1947. Supplement to Information Circular 7432, by A. B. Hooker. 1948. 5 pp. This list of electrically operated mine equipment tested during 1947 and approved as safe for use in gassy coal mines in a supplement to IC 7432, Permissible mine equipment approved to January 1, 1947, with appended list of available flame lamp fuels.
- IC 7466. Electrolytic Preparation of Zinc Dust, by Walter Eckardt, translated by O. C. Ralston. 1948. 6 pp. This paper based on research at Ludwigshafen laboratory of the I. G. Farbenindustrie A. G., of Germany, describes German laboratory methods for producing electrolytic zinc dust, a material used in manufacturing butadiene for synthetic rubber and in preparing reducing agents in the dye industry. Discussions of the electrolyte, anodes, cathodes, construction details of a commercial apparatus, and a comparison of the physical and chemical properties of electrolytic and smelter zinc dusts are included.
- IC 7467. Some Observations on Coal-Mine Haulage Hazards, by H. E. Sanford. 1948. 13 pp. Describes some of the principal hazards of transportation in coal mines and ways of minimizing them.
- IC 7468. Safety Achievements of the Continental Mine, Continental-Archbald Coal Co., Scranton, Lackawanna County, Pa., by E. H. McCleary, H. A. Schrecengost, Alfred Clarkson, and H. R. Gill. 1948. 18 pp. This report describing safety achievements and operating methods at the 88-year-old Continental mine of the Continental-Archbald Coal Co., Scranton, Pa., illustrates to coal-mining industry and workers in other hazardous occupations the results of concerted efforts in preventing fatal accidents.
- IC 7469. A Selected Bibliography on Briquetting of Coal and Other Carbons, by Paul L. Fisher. 1948. 15 pp. Bibliography contains 163 references and 161 patent listings arranged in chronological order. In addition to Government publications, references include articles appearing in technical press and joint cooperative reports of tests conducted by Bureau with States, colleges, and industries.
- IC 7470. Bibliography of Reports Containing Analyses of Crude Oils by the Bureau of Mines Routine Method, by Elizabeth Hughes and O. C. Blade. 1948. 68 pp. Designates 115 publications or reports in which 2,457 crude-oil analyses have appeared, either as special compilations, in connection with reports of Bureau of Mines research on petroleum, or as special articles for the technical press. Lists references to crude-oil analyses from 22 States and Alaska as well as a number of foreign countries in both hemispheres. Work done in cooperation with State of Oklahoma.
- IC 7471. Control of Roof and Prevention of Accidents from Falls of Rock and Coal. Suggested Roof Supports for Use at Faces in Conjunction with Mechanical Loading, by Edward Thomas, C. H. Seeling, Frank Perz, and M. V. Hansen. 1948. 9 pp., 17 figs. Second in a series, this publication describes improved methods of roof support designed to protect face workers in mechanized coal mines against the hazards of falling rock and coal. The various methods of roof support discussed are the pin-jack method, skid-mounted supports, expansion-bolt method, peg timbering, the hitch method, and suspension supports. Detailed drawings and photographs illustrating the various roof-support methods discussed are included. (See also IC 7461.)
- †IC 7472. A Skull Breaker in a Limestone Quarry, by McHenry Mosier. 1948. 4 pp., 1 fig. Use of a skull breaker, a 2-ton manganese-steel ball, for breaking stone instead of secondary blasting at a Pennsylvania limestone quarry has lowered mining costs, proved a timesaver, and reduced hazards among workers. Describes design and operation of skull breaker.
- †IC 7473. Making Iron Powder in the Tunnel Kiln, by V. H. Gottschalk. 1948. 16 pp. Based on four German reports, this paper supplements four other Government publications describing Bureau of Mines research on brickyard sponge iron. Describes German methods for producing iron powder in a ceramic tunnel kiln and gives costs of producing iron powder.
- IC 7474. Ignition Qualities of Hydrocarbons in the Diesel-Fuel Boiling Range, by A. D. Puckett and B. H. Caudle. 1948. 14 pp. Summarizes present knowledge of the ignition qualities of pure hydrocarbons likely to be present in modern Diesel-engine fuels, as shown by an extensive search of technical literature, and discusses possible significance of cetane number and hydrocarbon structure. Tabulates cetane or cetene numbers and other physical properties for about 100 hydrocarbons. Includes bibliography.
- IC 7475. Methods Used in Evaluating Adsorbent Clays, by Staff, Tuscaloosa Branch, Metallurgical Division, Southern Experiment Station, Tuscaloosa, Ala. 1948. 29 pp., 10 figs. One of series dealing with testing of clays and designed to form a section of Part II, Syllabus of Clay Testing, this report describes standard methods of testing the oil-clarifying or decolorizing capacities of commercial clays used by the oil industry. (See also B 451.)
- IC 7476. Design and Operation of Electrical Control Mechanisms in Underground Pumping Plants. Progress Report 1, by Albert C. Durham. 1948. 21 pp., 7 figs. Describes two types of modern automatic pumping plants—underground submerged-type plant and underground open-type plant—designed to remove water from Pennsylvania anthracite mines, where millions of tons of anthracite are inundated by underground water pools.
- †IC 7477. Shaft Sinking by Diamond Drilling, Bellefonte Mine, National Gypsum Co., Centre County, Pa., by McHenry Mosier. 1948. 6 pp., 4 figs. Diamond drilling was used successfully in opening an air shaft from underground workings at Bellefonte limestone mine of National Gypsum Co. in Centre County, Pa. Safety and speed are among the advantages of this method. Includes photographs of the equipment and a diagram of the arrangement of the holes and gives a detailed description of the methods used, the difficulties encountered, and the improvements in procedure suggested by experience.
- IC 7478. Emergency Escapeways from Coal Mines, by R. T. Artz and O. V. Simpson. 1948. 11 pp., 15



- figs. To illustrate importance of maintaining travelable emergency escapeways from all coal mines, this paper cites three coal-mine fires in which some miners lost their lives and others escaped uninjured. With text and maps, it suggests way of laying out interconnecting systems that will not only provide emergency exits from all working sections but may also reduce cost of power for ventilation by providing more intake air channels. As it is almost impossible to provide escapeways that will be serviceable under all conditions following mine fires and explosions, other expedients for escaping, including use of miner's self-rescuer (a pocket-size respirator), erecting fire doors to permit flexible control of air currents, installing emergency hoists, and building barricades for protection against poisonous gases following an explosion or a fire, are discussed.
- IC 7479. Hazards of Entering Old Mine Workings, by Allen D. Look, Leonard A. Van Fleet, and Stanley M. Walker. 1948. 18 pp. In describing hazards of entering old mine workings, foul air, including lack of enough oxygen to support life and the presence of poisonous gases such as carbon monoxide, is cited as one of most common dangers. Gives numerous instances of death and injury resulting from accidents in abandoned mines, quarries, and open pits. Reprints a warning folder, illustrated with cartoons, issued by Arizona Small Mine Operators Association.
- IC 7480. Breaking Coal With Airdox, by J. S. Malesky. 1948. 9 pp., 13 figs. Compressed air has replaced explosives for breaking coal from bed in a number of mines in Illinois and Indiana and a few in other States. The apparatus, known by trade name Airdox, and its operation are described, with advantages and disadvantages listed.
- †IC 7481. Methods of Producing Ultra-Clean Coal for Electrode Carbon in Germany, by H. G. Graham and L. D. Schmidt. 1948. 13 pp., 3 figs. Describes German processes for producing coals of exceptionally low ash content suitable for the manufacture of high-grade electrode carbons.
- IC 7482. Some Outstanding Safety Records in the Mining and Allied Industries, by R. G. Warncke and Stanley M. Walker. 1948. 24 pp. Intelligent planning, intense effort and training by management, and cooperation of workers are responsible for many outstanding safety records in American coal and metal mines. Contains tables prepared from records of Joseph A. Holmes Safety Association showing safety awards according to industries and States, outstanding records of no-cost time from injuries and long periods without fatalities made by major branches of mining industry—underground and open-pit iron, coal, copper and metal mines, and cement plants and quarries.
- †IC 7483. Petroleum Refineries, Including Cracking Plants, in the United States, January 1, 1948, by F. S. Lott. 1948. 21 pp., 1 fig. Lists capacities of petroleum refineries and cracking plants in United States on January 1, 1948. Included also are summary tables that bring up to date long-term series of yearly data last published in IC 7161, released in 1941. Includes tables giving summary of refineries by years, 1914–48; summary of refineries by States and districts, January 1, 1948; changes in crude-oil capacities by districts annually since 1941; summary of cracking plants, 1925–48; summary of capacity of cracking plants by States, January 1, 1948; and capacity of cracking plants, by three principal types and districts.
- IC 7484. Report of Petroleum and Natural-Gas Division, Fiscal Year 1947, by R. A. Cattell and others. 1948. 65 pp., 34 figs. Reviews work done by Petroleum and Natural-Gas Division during fiscal year, including studies of oil and gas development and production, secondary recovery of oil, petroleum chemistry and refining, thermodynamics of petroleum, natural-gas research, helium utilization and research, and uses of helium.
- †IC 7485. Safety in the Mining Industry, by D. Harrington, J. H. East, Jr., and R. G. Warncke. 1949. 157 pp., 29 figs. Provides information relative to mine accidents and their causes and shows that progress has been made over a period of many years even though much remains to be done. (See B 481.)
- †IC 7486. Improvements in Hydrogenation of Coal, by L. L. Hirst, L. C. Skinner, and E. E. Donath. 1948. 7 pp., 1 fig. Improvements in equipment design and modification of some processes will make it possible to reduce plant-construction costs and cut gasoline-manufacturing costs in a 30,000-barrel-a-day plant for converting coal to synthetic liquid fuels by hydrogenation. Includes a flowsheet of the liquid and vapor phases of coal hydrogenation and a general description of the hydrogenation process.
- †IC 7487. Activities of the Health and Safety Division, Bureau of Mines, United States Department of the Interior, During the War Years, 1941–45, by D. Harrington. 1949. 40 pp., 10 figs. Presents brief historical record of the activities of the Health and Safety Division as a whole and wartime activities of the individual branches—the Safety Branch, Health Branch, Coal-Mine Inspection Branch, Explosives Control Branch, and Mineral Production Security Branch.
- IC 7488. Natural-Gasoline and Cycle Plants in the United States, January 1, 1948, by F. S. Lott and E. M. Seeley. 1948. 17 pp. During the 2-year period January 1, 1946, to January 1, 1948, natural-gasoline industry in the United States increased the total capacity to produce light hydrocarbon products from 17,928,000 gallons (426,860 barrels) to 21,322,000 gallons (507,670 barrels) a day, accord-

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- ing to a biennial survey of the industry described in this circular. Results of survey, including types of plants and daily capacities by States, are included.
- IC 7489. Change Houses in the Lake Superior District, by Frank E. Cash and Roy G. Stott. 1949. 26 pp., 37 figs. Describes four modern change houses at mines in the Lake Superior iron-ore district. Improvements in design and construction of modern change houses have largely eliminated intermingling of men in mine clothes and men in street clothes, hazardous dust, heat and humidity, crowding, poor lighting, slippery and muddy floors, and inadequate facilities for clothes and for bathing. Includes diagrams of floor plans and heating systems and illustrations of mine-clothes rooms, shower rooms, washroom facilities, clothes lockers, and boot washers.
- IC 7490. German Low-Temperature Coal-Tar Industry, by E. O. Rhodes. 1949. 84 pp., 45 figs. One of series written by members of Solid Fuels Mission to Germany, organized early in 1945 under auspices of Technical Industrial Intelligence Committee, describes German production of coal tar by low-temperature methods. Part I deals with hydrogenation, distillation and cracking, yields of products by different operating procedures, and refining and use of tar acids. Part II includes brief, technical reports on interviews with officials of leading low-temperature tar companies and first-hand reports on visits to German plants. Part III contains an index of German scientific literature on low-temperature carbonization of bituminous coals.
- IC 7491. Investigation of Fire in the Kings Mine, Princeton Mining Co., Princeton, Ind., by C. A. Herbert, W. A. Gallagher, and F. J. Smith. 1949. 14 pp., 4 figs. Describes investigation of a fire in Kings coal mine, which was sealed on the surface following a series of explosions, and shows how expert planning and close cooperation on the part of various organizations might overcome adverse conditions when reopening a sealed mine.
- IC 7492. Hazards of Black Blasting Powder in Underground Coal Mining, by D. Harrington and R. G. Warnecke. 1949. 20 pp., 3 figs. To help reduce explosion hazards in coal mines using dangerous black blasting powder, this circular outlines precautions designed to increase the safety factor in using this explosive.
- IC 7493. Major Disasters at Metal and Nonmetal Mines and Quarries in the United States (Excluding Coal Mines), by John Hyvarinen, Leland H. Johnson, and D. O. Kennedy. 1949. 26 pp. Contains a chronological list of accidents since 1869 at metal and nonmetal mines and quarries (excluding coal mines) in United States and Alaska in which five or more lives were lost.
- IC 7494. Safe Electrical Practices in Two Arizona Open-Pit Mines, by J. Hyvarinen and A. D. Look. 1949. 18 pp., 18 figs. Presents some of the safe electrical practices used in 2 open-pit mines operated by 2 large copper-mining companies in Arizona.
- †IC 7495. Shaft-Sinking Methods and Costs and Cost of Plant and Equipment at the Fad Shaft, Eureka Corp., Ltd., Eureka, Nev., by George W. Mitchell and A. C. Johnson. 1949. 17 pp., 15 figs. Describes method of sinking the Fad shaft, including ventilation and the cycle of operations, and summarizes costs of preparation, plant, and equipment.
- IC 7496. The Japanese Aluminum Industry, by Glenn L. Allen and Virgil Miller. 1949. 56 pp., 22 figs. Describes aluminum production in former Japanese Empire, which consisted of Japanese Home Islands and its dependencies, Formosa, Manchuria, and Korea.
- IC 7497. Mining Practices at the Harrington-Hickory Mine, Beaver County, Utah, by Paul T. Allsman. 1949. 15 pp., 1 fig. Describes how a small lead-silver-zinc mine in Beaver County operated efficiently and economically during and after World War II, when equipment, supplies, and labor were costly and difficult to obtain.
- IC 7498. Fire Fighting Facilities at Four Pennsylvania Bituminous-Coal Mines, by G. W. Grove and O. V. Simpson. 1949. 17 pp., 84 figs. Describes fire-prevention programs and fire-fighting facilities at four large Pennsylvania bituminous-coal mines, emphasizing importance of recognizing and correcting fire hazards.
- IC 7499. Reopening and Developing a Small Red-Iron-Ore Mine, Gadsden, Ala., by John C. Feeley, Jr. 1949. 28 pp., 29 figs. Describes methods used in reopening and developing a small Alabama red-iron-ore mine that had been idle since shortly after World War I.
- IC 7500. Prospect Drilling for Phosphates in Florida, by John C. Feeley, Jr. 1949. 15 pp., 22 figs. Describes methods used by Florida phosphate-mining companies to determine size and quality of deposits and to obtain other information needed for production and operation estimates.
- IC 7501. Safety Practices at United Verde Mine, Phelps Dodge Corp., Jerome, Ariz., by Allen D. Look and Alan A. Sharp. 1949. 25 pp., 6 figs. Describes a well-organized all-around safety program that has resulted in a consistently low accident-frequency record at the United Verde copper mine.
- IC 7502. Mining Methods and Costs at the Atwood Copper Mine, Lordsburg Mining District, Hidalgo County, N. Mex., by Walter R. Storms. 1949. 11 pp., 5 figs. Describes operating practices and costs at the Atwood copper mine, one of the oldest of a group of claims in the Lordsburg mining district.
- IC 7503. Safeguarding Underground Workmen From Noxious Gases Resulting from Blasting in Strip

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- Mines, by E. H. McCleary, M. W. Price, and Joseph V. Mather. 1949. 8 pp., 14 figs. Describes precautions taken to protect workmen in a group of underground anthracite mines from carbon monoxide and other toxic gases released by blasting at adjacent strip mines.
- IC 7504. Coproducts of Coke in the United States, 1919-47, by J. A. DeCarlo and J. A. Corgan. 1949. 31 pp., 4 figs. Presents the trend in production, sales, values, and yields of the principal coproducts of coke—gas, tar, ammonia, and crude light oil—in the United States from 1919 through 1947.
- IC 7505. Report of Petroleum and Natural-Gas Division, Fiscal Year 1945, by R. A. Cattell and others. 1949. 22 pp., 18 figs. Reviews work done by Petroleum and Natural-Gas Division during fiscal year, including studies of oil and gas development and production, secondary recovery of oil, petroleum chemistry and refining, thermodynamics of petroleum, and helium production.
- IC 7506. Report of Petroleum and Natural-Gas Division, Fiscal Year 1946, by R. A. Cattell and others. 1949. 52 pp., 24 figs. Reviews work done by Petroleum and Natural-Gas Division during fiscal year, including studies of helium utilization and research, oil and gas development and production, secondary recovery of oil, petroleum chemistry and refining, and thermodynamics of petroleum.
- IC 7507. Mining Methods and Costs at the Kearney Zinc-Lead Mine, Central Mining District, Grant County, N. Mex., by Walter R. Storms and Jerry W. Faust. 1949. 11 pp., 9 figs. Describes mining methods and operating costs at the Kearney zinc-lead mine of the New Mexico Consolidated Mining Co., near Hanover, N. Mex.
- IC 7508. Formation Sampling With Large-Diameter Drill Holes at Fort Randall Dam Site, South Dakota, by Roswell W. Prouty. 1949. 20 pp., 9 figs. Describes Army drilling methods at the Fort Randall dam site in South Dakota. Includes core-recovery procedure and labor wages and other costs.
- IC 7509. Slope Sinking Through Water-Bearing Strata at Mine 3, Bell & Zoller Coal & Mining Co., Williamson County, Ill., by Joseph J. Shields and Louis A. Turnbull. 1949. 5 pp., 7 figs. Describes methods used by Bell & Zoller Coal & Mining Co. to sink 2 coal-mine slopes through 70 feet of water-saturated sandy clay at Mine 3 near Zeigler, Ill.
- IC 7510. Accident Experience Iron-Ore Mines, Lake Superior District 1940-47, by Frank E. Cash. 1949. 16 pp., 2 figs. Reviews 1940-47 accident experience in Nation's chief iron-ore producing region, the Lake Superior district.
- IC 7511. Mining Methods and Practices at International Minerals & Chemical Corp. Potash Mine, Eddy County, N. Mex., by George T. Harley and Walter R. Storms. 1949. 21 pp., 17 figs. Describes mining methods and practices in a large potash mine in Eddy County operated by International Minerals & Chemical Corp.
- IC 7512. A Reconnaissance of Lode Mines and Prospects in the Bohemia Mining District, Lane and Douglas Counties, Oreg., by John W. Taber. 1949. 50 pp., 8 figs. Presents history and geology of Bohemia mining district, a small but intensely mineralized area in western Oregon, and describes mining methods followed there from beginning of lode mining in 1868.
- †IC 7513. Supplemental List of Respiratory Protective Devices Approved by the Bureau of Mines, Additions to List Published in IC 7444, by L. B. Berger. 1949. 3 pp. Lists respiratory protective devices that have been approved by Bureau since IC 7444, List of Respiratory Protective Devices Approved by the Bureau of Mines, was issued in 1948.
- IC 7514. Methods and Costs of Mining Fluorspar From a Flat-Bedded Deposit at Cave-in-Rock, Ill., by A. B. Needham. 1949. 10 pp., 11 figs. Describes methods and practices used in the development and operation of Minerva Oil Co. mine No. 1 in the Cave-in-Rock fluorspar district in southern Illinois.
- IC 7515. Two Devices to Prevent Electric Arcs With Airdox Operations in Coal Mines, by F. J. Gallagher. 1949. 5 pp., 4 figs. Describes two recent developments for preventing electric arcs or sparks in coal mines when using Airdox, a compressed-air blasting device.
- †IC 7516. Bibliography of Investment and Operating Costs for Chemical and Petroleum Plants, compiled by W. I. Barnet. 1949. 53 pp. This bibliography, designed to assist plant managers in estimating equipment and operating costs of specific petroleum refining and chemical processes, contains indexes for equipment and plant investment costs and for equipment and process operating costs. Presents abstracts of publications cited in the indexes. Work done in cooperation with University of Wyoming.
- IC 7517. Quarrying Methods and Practices, U. S. Lime Products Corp., Clark County, Nev., by George H. Holmes, Jr. 1949. 15 pp., 14 figs. Describes quarrying methods and crushing practices at 2 limestone quarries, with calcining and milling operations at 2 plants of U. S. Lime Products Corp. in Clark County.
- IC 7518. Annual Report of Research and Technologic Work on Coal, Fiscal Year 1948, by A. C. Fieldner and Sidney Gottlieb. 1949. 87 pp., 60 figs. Diversified research on coal by Bureau in 1948 fiscal year yielded additional coal reserves in several States, stretched Nation's supply of coking coal by developing blends, improved techniques for producing synthetic liquid fuels, and again afforded savings in purchase of Government fuel supplies and operation of fuel-burning equipment.
- †IC 7519. Questions and Answers on Propane and Butane Fuels, by J. F. Barkley. 1949. 9 pp., 8 figs. This circular, describing the properties and safe handling of butane and propane fuels—two types of liquefied petroleum gas used throughout the United States—has been issued to supply information to the rapidly increasing number of domestic and commercial consumers of these fuels.
- †IC 7520. Small Portable Coal-Dust Explosion Gallery, by G. W. Grove and G. L. Freas. 1949. 3 pp., 3 figs. Describes a small, portable coal-dust explosion gallery, designed to show how a cloud of bituminous-coal dust will explode if ignited by a spark or flame.
- IC 7521. Selected List of References on Minerals and Related Subjects, by D. G. Runner. 1949. 9 pp. Revision of IC 6148R, Selected Bibliography of Minerals and Their Identification, published in 1938, this circular includes only the most commonly used references generally available in public college libraries.
- †IC 7522. Operations and Safety at the Retsof Rock Salt Mine, by William Eathorne. 1949. 12 pp., 14 figs. Describes methods and practices at the Retsof rock salt mine, believed to be largest producing salt mine in the world. An outstanding safety record has been maintained at the mine for more than 2½ decades.
- †IC 7523. Laboratories That Make Fire Assays, Analyses, and Tests on Ores, Minerals, Metals, and Other Inorganic Substances, by Bertha R. Klahold. 1949. 55 pp. This circular, a revision of IC 6999R, Laboratories That Make Fire Assays, Analyses, and Tests on Ores, Minerals, Metals, and Other Inorganic Substances, published in 1939, lists laboratories in United States and Canada where mineral samples may be sent for identification and other special tests to determine their value.
- IC 7524. Mining Methods and Costs at the Atlas No. 2 Zinc-Lead Mine, West Pinos Altos Mining District,

†Out of print.

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- Grant County, N. Mex., by Walter R. Storms. 1949. 11 pp., 7 figs. Describes mining methods and costs at the Atlas No. 2 zinc-lead mine.
- IC 7525. Method and Cost of Driving the Rock Creek Tunnel, Hecla Mining Co., Shoshone County, Idaho, by D. W. Butner. 1949. 5 pp., 4 figs. Describes time-saving equipment and methods used by Hecla Mining Co. in driving the Rock Creek tunnel 4,483 feet in 213 days.
- †IC 7526. Conveyor Systems in Underground Iron-Ore Mines, Lake Superior District, by Eugene O. Binyon. 1949. 33 pp., 27 figs. Describes deposits and methods of operation of the various mines, with emphasis on the conveyor installations.
- IC 7527. Mechanical Mining in Some Bituminous-Coal Mines. Progress Report 5. Extraction of Pillars With Mechanized Equipment, by Louis A. Turnbull and Albert L. Toenges. 1949. 59 pp., 25 figs. Describes how mechanized equipment is used successfully at 10 bituminous-coal mines in Pennsylvania, West Virginia, and Wyoming to remove pillars—masses of coal left to support the overlying strata while a mine is being developed. (See also IC 7631.)
- IC 7528. Review of Literature on Conditioning Air for Advancement of Health and Safety in Mines. Part III. Methods of Controlling the Chemical and Physical Qualities of Underground Air, by J. J. Forbes, Sara J. Davenport, and Genevieve Morgis. 1949. 57 pp. One of series reviewing literature on air conditioning in mines, contains bibliography listing 64 publications and reports and describes ventilating and air-conditioning systems now in use in various parts of the world. Included are discussions of methods for determining and controlling chemical and physical qualities of mine air.
- IC 7529. Phosphate-Rock Mining in Southeastern Idaho, by D. W. Butner. 1949. 18 pp., 5 figs. Although southeastern Idaho's large phosphate-rock deposits now yield more than three-quarters of entire western production of this important mineral commodity, their full commercial exploitation depends upon further improvements in mining and metallurgical practices. Seventy-five percent of the Idaho tonnage is produced by strip-mining methods; publication also discusses feasibility of other mining techniques as shrinkage stoping, square-set stoping, top slicing, room-and-pillar methods, longwall methods, and caving methods.
- IC 7530. Routine Ventilation Surveying in South Wales Anthracite Mines, by Cloyd M. Smith. 1949. 11 pp., 2 figs. Describes how a British anthracite-mining company conducts periodic ventilation surveys of its 24 collieries in South Wales.
- IC 7531. Publications of the Bureau of Mines on Coal Washing, compiled by William L. Crentz. 1949. 7 pp. Lists 64 publications on coal washing issued during the past 39 years.
- †IC 7532. Report of Petroleum and Natural-Gas Branch, Fiscal Year 1948, by R. A. Cattell and others. 1949. 64 pp., 30 figs. Gives results of research program conducted by Petroleum and Natural-Gas Branch during fiscal year on problems dealing with production of oil and gas, transportation of natural gas, chemistry and refining of petroleum, thermodynamic properties of hydrocarbons, and processing and utilization of incombustible helium gas.
- IC 7533. Suspension Roof Support. Progress Report 1, by Edward Thomas, A. J. Barry, and Arthur Metcalfe. 1949. 13 pp., 19 figs. How the Bureau of Mines has adapted suspension supports to conditions found in American coal mines is given in an intensive attack upon the problem of preventing mine roof and rock from falling prematurely.
- †IC 7534. Revised Bibliography of Bureau of Mines Investigations on the Production of Liquid Fuels From Oil Shale, Coal, Lignite, and Natural Gas (to 1949), by Norma Golumbic, Hazel C. Anderson, and Robert C. Grass. 1949. 53 pp. Revision of IC 7804, Bibliography of Bureau of Mines Investigations on the Production of Liquid Fuels From Oil Shale, Coal, Lignite, and Natural Gas, published in 1945, circular contains 736 references on synthetic liquid-fuel publications.
- IC 7535. Part I. Guide to Prospecting for Lode Gold, by El. D. Gardner. Part II. Locating Mining Claims on the Public Domain, by Marion Clawson. 1950. 21 pp. Revision of IC 6843B, Prospecting for Lode Gold and Locating Claims on the Public Domain, issued in 1936, part I of this publication offers many useful suggestions on prospecting outfits and provisions, tools, cooking equipment, clothing, and first-aid supplies and discusses such topics as gold lodes and ore shoots, searching techniques, associated minerals, sampling and panning, and surface weathering. Part II is a digest of Federal laws pertaining to the location of mining claims on the public domain and covers lands to which mining laws apply, mineral discovery, location of lode claims, assessment work, mining claims on stock-raising homesteads, timber rights, adverse claims, fissionable materials, and other similar topics.
- IC 7536. History of Premium Price Plan for Copper, Lead and Zinc, 1942-47, by H. E. Olund and S. A. Gustavson. 1950. 210 pp., 4 figs. Gives history of the Premium Price Plan used by Government during World War II to expand production of critically needed copper, lead, and zinc and to keep prices for these scarce metals on a reasonably even keel. Includes charts and tables comparing production costs, data on exploration premiums, examples of calculations to determine quotas, copies of regulations, and other forms.
- IC 7537. Petroleum Refineries, Including Cracking Plants, in the United States, January 1, 1949, by F. S. Lott and I. S. Culver. 1949. 21 pp. Lists capacity of petroleum refineries and cracking plants in the United States on January 1, 1949. Includes tables giving summary of refineries by years, 1914-49; summary of refineries by States, January 1, 1949; summary of refineries by districts, January 1, 1949; summary of cracking plants, 1925-49; summary of capacity of cracking plants by States, January 1, 1949; and capacity of cracking plants, by three principal types and districts, January 1, 1949.
- IC 7538. Average Heating Values of American Coals by Rank and by States, by George J. Flynn, Jr. 1949. 11 pp. Lists average heat contents of the various coals produced in the United States. Describes methods used in making calculations; contains tables showing State and national averages by rank, including average heating values previously published; and lists numerous technical papers previously issued by Bureau containing chemical analyses of coal, with data by counties and States.
- †IC 7539. Mining Methods and Practices at the Iron King Mine, Shattuck-Denn Mining Corp., Yavapai County, Ariz., by Charles A. Kumke and H. F. Mills. 1950. 17 pp., 11 figs. Describes mining operations at the Iron King mine of the Shattuck-Denn Mining Corp.
- IC 7540. Mines and Mineral Deposits (Except Fuels), Meagher County, Mont., by Robert N. Roby. 1950. 43 pp., 4 figs. Discusses mines and mineral deposits in the Castle Mountain, Murray (Battle Creek), Musselshell, Tenderfoot-Sheep Creek, and Beaver Creek districts in Montana.
- IC 7541. Summary of Published Information on Large-Capacity Compressed-Air Receivers for Underground Mines, by Andrew Allan, Jr. 1950. 7 pp.

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- Contains list of published articles pertaining to large-capacity compressed-air receivers for underground mines, with a brief summary of the contents of each.
- IC 7542. Observations of Safety Practices and Conditions in Japanese Coal Mines, by Russell G. Warncke. 1949. 38 pp. Report is based primarily on study of safety conditions and practices followed in coal mines of Japan. In Japan, as in all coal-producing countries, the greatest cause of injuries is falls of roof and coal, with haulage accidents second. Explosions of gas and coal dust take a heavy toll.
- IC 7543. Mining Methods at the Brucite Deposit, Basic Refractories, Inc., Gabbs, Nye County, Nev., by George H. Holmes, Jr. 1949. 10 pp., 7 figs. Describes operations and mining methods at Basic Refractories, Inc., brucite deposit, the only commercial deposit of brucite in production in United States. Brucite is a mineral used in the manufacture of fire brick and refractories for open-hearth steel furnaces.
- IC 7544. Mines and Mineral Deposits (Except Fuels), Fergus County, Mont., by Almon F. Robertson. 1950. 76 pp., 6 figs. One of series based upon investigations made within the Missouri River Basin in Montana by Bureau engineers. Describes principal metal mines and prospects and points out that metal mining has been confined mainly to gold and silver deposits. Only a few of the county's deposits of nonmetallic minerals have been exploited. Two companies mine and process gypsum, and one is mining a thick bed of maroon-colored shaly clay from which it manufactures brick and tile.
- IC 7545. The National Safety Competitions of 1944-47, by Forrest T. Moyer, Joseph H. Schuster, J. I. Davis, and E. K. Elsner. 1949. 81 pp. Sponsored by Bureau of Mines, the National Safety Competition has been held annually since 1925. Summarizes safety records of individual companies and industry groups during 1944-47 period and injury experience of each industry group as a unit over the 23-year period, gives individual records of injury experience of each entrant for 1944-47, and includes a list of all winners of awards during 1944-47 period.
- IC 7546. Mines and Mineral Deposits (Except Fuels), Park County, Mont., by Glenn C. Reed. 1950. 68 pp., 16 figs. Since 1862, when placer gold was first discovered in the Park County region, Park County has produced gold, silver, and other metals valued at more than \$8,000,000. Mineral investigations made by Bureau during 1947 and 1948 in Park County and in several nearby areas of Sweet Grass County to obtain information on existing conditions in the mineral industry of these districts are described.
- IC 7547. Underground Transportation in the Ruhr Coal-Mining District of Germany, by R. W. Stahl, H. E. Sanford, and J. B. Benson. 1950. 9 pp., 9 figs. According to a haulage survey made by Bureau engineers of Ruhr coal mines in Germany, most of the mines were opened decades ago, many features are outmoded, and modernizing the haulage systems would be costly. Includes descriptions of various haulage conditions, such as hoisting, loading, tipples, roadways, tracks, switches, conveyors, and locomotives and cars, with photographs of certain typical equipment.
- IC 7548. Safety Practices in Churn Drilling at Morenci Branch, Phelps Dodge Corp., Morenci, Ariz., by Alan A. Sharp and Allen D. Look. 1950. 22 pp., 2 figs. Describes a well-organized safety program in use at the open-pit copper mine at the Morenci Branch. Frequent reviews of safety codes and familiarity with possible hazards that may occur around churn-drill equipment contribute to an unusually good safety record at the Morenci Branch.
- IC 7549. Conditions and Practices at Coal Mines in the Ruhr District of Western Germany, by J. B. Benson, H. E. Sanford, and R. W. Stahl. 1950. 48 pp., 47 figs. The principal German coal-producing areas, the Ruhr and Aachen districts, are in British occupation zone, but the mines there are under joint British-American supervision. Presents a complete survey of safety conditions and practices at coal mines in the Ruhr area.
- IC 7550. Economic Importance of Pegmatites, by Paul M. Tyler. 1950. 57 pp. Includes discussions on geographic location of granitic pegmatites, general geology, mineralization, prospecting, mining and milling methods and costs, and general economic considerations.
- †IC 7551. Report of Petroleum and Natural-Gas Branch, Fiscal Year 1949, by R. A. Cattell and others. 1950. 50 pp., 20 figs. Reviews work done by Petroleum and Natural-Gas Branch during fiscal year, including studies of oil and gas development and production, secondary recovery of oil, petroleum chemistry and refining, thermodynamics of petroleum, transportation of natural gas, helium utilization and research, and helium production and process development.
- IC 7552. Drilling and Blasting, Open-Cut Iron-Ore Mines, Lake Superior District, by John A. Johnson, Floyd G. Anderson, and Roy G. Stott. 1950. 37 pp., 18 figs. One of a series describing iron-ore mining practices in the lake Superior district to aid in preventing accidents in that industry, this circular discusses drilling and blasting in open-cut iron-ore mines.
- †IC 7553. Thallium: Properties, Sources, Recovery, and Uses of the Element and Its Compounds, by William H. Waggaman, Gladys G. Hefner, and Edwin A. Gee. 1950. 50 pp. Discusses properties, history, sources, extraction, preparation, and uses of thallium. Includes bibliography.
- †IC 7554. Reconnaissance of Metal Mining in the San Juan Region, Ouray, San Juan, and San Miguel Counties, Colo., by William H. King and Paul T. Allsman. 1950. 109 pp., 23 figs. Describes mineral deposits and discusses mining and milling methods of various companies in the San Juan region. Includes flow sheets of mills in the area.
- IC 7555. Mining, Milling, and Manufacturing Methods at the Blue Diamond Corp.'s Gypsum Property, Clark County, Nev., by George H. Holmes, Jr. 1950. 21 pp., 14 figs. Describes mining, milling, and manufacturing methods used at the Blue Diamond Corp.'s gypsum property in Clark County.
- †IC 7556. Historical Résumé of Mine and Tunnel Ventilation Studies, Bureau of Mines, 1910-49, by G. E. McElroy. 1950. 16 pp. Summarizes mine and tunnel ventilation studies made by Bureau between 1910 and 1949. Includes bibliography.
- IC 7557. Fuel-Burning Equipment Dimensions Required by Smoke-Abatement Ordinances, by J. F. Barkley and R. E. Morgan. 1950. 19 pp., 9 figs. Summarizes restrictions on the sizing of fuel-burning equipment imposed by smoke-abatement ordinances of 20 cities and counties, including Toronto, Canada.
- †IC 7558. Carbide Insert Bit Drilling at the Cleveland-Cliffs Iron Co. mines, Ishpeming, Mich., by Walter E. Lewis. 1950. 16 pp., 10 figs. Describes the successful experimental use of tungsten carbide insert bits at mines of the Cleveland-Cliffs Iron Co., on the Marquette iron-ore range at Ishpeming and Negaunee, Mich., and compares the effectiveness of tungsten carbide insert bit drilling with that of conventional detachable steel bits in both "hard-ore" and "soft-ore" deposits.

†Out of print.

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- IC 7559. Coal for Coke Production, by Arno C. Fieldner. 1950. 21 pp., 5 figs. Reviews briefly our fuel reserves, with special reference to coking coal, and discusses problems of utilizing progressively poorer coking coals as the reserves of high-quality coals approach depletion. Paper presented at meeting of American Coke and Coal Chemicals Institute, Skytop, Pa., October 4, 1949.
- IC 7560. Mining Methods and Costs at the Highland Surprise Mine, Shoshone County, Idaho, by D. W. Butner. 1950. 11 pp., 7 figs. Describes methods and costs of mining zinc-lead ore at the Highland Surprise Mine where production increased from 15,813 tons of ore mined in 1943 to 65,461 tons in 1948.
- IC 7561. The Use of Dust Respirators in Coal Mines, by S. J. Pearce. 1950. 6 pp. Describes various types of respiratory dust-filtering equipment in general use, outlines precautions for properly selecting and using the respirators, and points out that they are designed only for temporary use or where dust-control measures are impracticable, as in applying rock dust in bituminous-coal mines.
- IC 7562. Report of the Health and Safety Division, Fiscal Year 1949, by J. J. Forbes and W. J. Fene. 1950. 52 pp., 5 figs. Outlines activities and major accomplishments of each of 3 branches into which Division is divided—the Health Branch, the Safety Branch, and the Coal-Mine Inspection Branch—during the 12-month period.
- IC 7563. Extinguishing Fire With Carbon Dioxide in the Valier Mine, Valier Coal Co., Valier, Franklin County, Ill., by James Westfield, H. C. Brumbaugh, and R. W. Whittaker. 1950. 10 pp., 3 figs. Describes the sealing off of a fire in an Illinois coal mine and the successful use of carbon dioxide gas to extinguish it. Includes analyses of mine-air samples taken at regular intervals in the fire vicinity.
- †IC 7564. Fighting a Fire in No. 59 Mine, Peabody Coal Co., Springfield, Sangamon County, Ill., by J. A. O'Connor, J. S. Malesky, and T. C. Higgins. 1950. 19 pp., 3 figs. Describes a stubborn mine fire of electrical origin that started on the main haulage road of No. 59 mine of the Peabody Coal Co. and subsequent operations, including the rescue of 257 men in the mine.
- IC 7565. Annual Report of Research and Technologic Work on Coal, Fiscal Year 1949, by Arno C. Fieldner and Sidney Gottlieb. 1950. 97 pp., 45 figs. This report, based largely upon publications issued during fiscal year, summarizes research and technologic work of Bureau on coal and coal products during fiscal year, with continued emphasis on coking-coal reserves, conservation and mining safety, anthracite problems, and synthetic liquid fuels production.
- IC 7566. Review of Dust-Allaying Practices at Working Faces in Some Bituminous-Coal and Lignite Mines, by J. J. Forbes, R. K. Franklin, and S. T. Reese. 1950. 29 pp. Study embraces 1,637 bituminous-coal and lignite mines that employed 290,458 men and produced 1,755,080 tons daily in 23 States; includes a State-by-State summary of dust-allaying practices and tables on loading methods and the extent of dust allaying.
- IC 7567. Electrical Blasting at Miami Copper Co., Miami, Ariz., by Allen D. Look and Ernest R. Rodriguez. 1950. 19 pp., 7 figs. Describes blasting practices at an underground mine of the Miami Copper Co. near Miami, Ariz., that has operated since 1927 without a fatality from blasting or the handling of explosives; also contains detailed descriptions of storage and transportation of explosives.
- †IC 7568. Method of Excavation and Roof Support Used in Some Recently Constructed Tunnels, by S. P. Polack. 1950. 14 pp., 25 figs. Describes excavation methods, roof support, drilling, blasting, mucking, haulage, and ventilation used in six recently constructed railroad, vehicular, and water-carrying tunnels.
- IC 7569. Permissible Mine Equipment Approved During the Calendar Years 1947-49, by H. B. Brunot. 1950. 16 pp. Lists all permissible mine equipment tested and approved by the Bureau during 1947, 1948, and 1949 and supplements IC 7432, Permissible Mine Equipment Approved to January 1, 1947, with Appended List of Available Flame-Safety Fuels, issued in 1947. (See also IC 7606.)
- †IC 7570. List of Respiratory Protective Devices Approved by the Bureau of Mines, by S. J. Pearce and L. B. Berger. 1950. 16 pp., 14 figs. List respiratory protective devices approved by Bureau to June 1, 1950.
- IC 7571. Hydraulic Tunneling in St. Peter Sandstone at Minneapolis, Minn., by Walter E. Lewis. 1950. 12 pp., 7 figs. Describes hydraulic tunneling methods used in Minneapolis to cut cost of driving storm sewers through a sandstone formation underlying the city.
- IC 7572. Coal-Mine Explosions and Coal- and Metal-Mine Fires in the United States in 1949, by J. J. Forbes, W. J. Fene, and H. B. Humphrey. 1950. 17 pp., 2 figs. Gives summary of mine explosions, by States and causes; causes of explosions; explosion fatalities, by causes; causes of explosions of electrical origin; lighting in mines where explosions occurred; explosions in bituminous-coal mines; and mine fires.
- IC 7573. Achievements in Mine Safety Research and Problems Yet To Be Solved, by Arno C. Fieldner. 1950. 31 pp. Reviews advances in mine safety resulting from 40 years of research by Bureau, including research on permissible explosives and their use, dust and gas explosions, ventilation, respiratory protective equipment, electrical and mechanical equipment, and prevention of roof falls. Paper presented at Sixth International Conference of Directors of Safety in Mines Research at laboratories of the Centre d'Etudes et de Recherches des Charbonnages de France, Verneuil, France, July 24 to 29, 1950.
- IC 7574. Review of Literature on Health Hazards of Beryllium and Its Compounds, by G. G. Morgis and J. J. Forbes. 1950. 23 pp. Reviews industrial health hazards resulting from the handling of beryllium and its compounds and ways of controlling them.
- IC 7575. Effects of the Inhalation of Oxygen, by L. B. Berger and S. J. Davenport. 1950. 36 pp. Summarizes effects upon the human body of the inhalation of oxygen in various concentrations and at various pressures. Includes bibliography.
- IC 7576. Natural-Gasoline and Cycle Plants in the United States, January 1, 1950, by D. S. Colby and E. M. Seeley. 1950. 17 pp. During the 2-year period January 1, 1948, to January 1, 1950, the total production capacity of the natural-gasoline industry increased from 21,322,000 gallons (507,670 barrels) to 27,212,000 gallons (647,905 barrels) a day, according to a biennial survey of the industry described in this circular. Results of the survey, including types of plants and daily capacities by States, are included.
- †IC 7577. Central Mine Rescue Station, Globe-Miami District, Mine Rescue and First-Aid Association, Globe, Ariz., by L. A. Van Fleet and Allen D. Look. 1950. 20 pp., 6 figs. Experience has proved the value of the central mine rescue station of the Globe-Miami District Mine Rescue and First-Aid Association to the Arizona mining companies that cooperate in maintaining it and to the community. The central mine rescue station has provided the member mines with a dependable source of competent, well-equipped rescue teams for 80 years.

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- IC 7578. Petroleum Refineries, Including Cracking Plants in the United States, January 1, 1950, by F. S. Lott and J. G. Kirby. 19 pp. Lists capacity of petroleum refineries and cracking plants in the United States on January 1, 1950. Includes tables giving summary of refineries by years, 1914-50; summary of refineries by district, January 1, 1950; summary of refineries by States, January 1, 1950; summary of cracking plants by years, 1925-50; summary of cracking plants by States, January 1, 1950; and capacity of cracking plants by types and districts, January 1, 1950.
- IC 7579. The Possible Effect of the Expanding Use of Natural Gas on the Production of Coke and Coal Chemicals in the United States, by J. A. DeCarlo and J. A. Corgan. 1950. 16 pp., 2 figs. Bureau of Mines conducted a survey of all oven-coke plants operated by gas utilities, commercial or merchant companies, and merchant pig-iron producers to determine what effect the introduction of natural gas into certain areas might have on the production of oven coke, coke-oven gas, and coal chemicals.
- IC 7580. Burning Wood Waste for Commercial Heat and Power, by J. F. Barkley and R. E. Morgan. 1950. 12 pp., 11 figs. Describes equipment and practices developed to convert wood waste—sawdust, shavings, slabs, and bark—into commercial heat and power.
- †IC 7581. Mining and Milling Methods at San Xavier Mine, The Eagle-Picher Mining & Smelting Co., Pima County, Ariz., by Grover J. Duff and Charles A. Kumke. 1950. 13 pp., 10 figs. Describes mining and milling practices employed at the San Xavier silver-lead mine of the Eagle-Picher Mining & Smelting Co.
- IC 7582. Energy Uses and Supplies, 1939, 1947, 1965, by Harold J. Barnett. 1950. 53 pp., 6 charts. Summarizes preliminary results of an exploratory study of energy uses and supplies in United States. Study compares 1939, 1947, and estimated 1965 energy consumption and supply patterns.
- †IC 7583. Roof Bolting in the United States, by Edward Thomas. 1950. 8 pp., 1 fig. Discusses roof-bolting methods, emphasizing that each mine roof presents its own problems and that this procedure should not be employed until experimental installations have been made. Also deals with other aspects of roof bolting, such as drilling, methods of tightening and anchoring bolts, and controlling the dust hazard in drilling for roof bolting. Paper presented at Sixth International Conference of Directors of Mine Research, Paris, France, July 24-28, 1950.
- †IC 7584. Truck Haulage at the National Lead Co. Open-Cut Ilmenite-Magnetite Mine, Tahawus, N. Y., by Robert S. Sanford. 1950. 14 pp., 10 figs. Describes efficient, low-cost truck-haulage operations at the National Lead Co. open-cut ilmenite-magnetite mine.
- †IC 7585. Crude-Oil and Refined Products Pipeline Mileage in the United States, January 1, 1950, by A. T. Coumbe and I. F. Avery. 1950. 8 pp. Includes tables breaking down pipeline mileage by States, by diameter of pipe, and by products handled, presenting these data separately for trunk lines and gathering lines.
- IC 7586. Mining and Milling Methods at the Caselton Mine, Combined Metals Reduction Co., Pioche, Lincoln County, Nev., by George H. Homes, Jr. 1950. 24 pp., 24 figs. Presents a survey of mining and milling methods used at the Caselton mine of the Combined Metals Reduction Co.
- IC 7587. The Evaluation of Converters for Exothermic and Endothermic Catalytic Reactions Occurring Within Narrow Temperature Limits, by Gustav Wirth, translated by R. C. Grass and H. J. Kandiner. 1950. 13 pp., 18 figs. Presents calculations for determining the effectiveness of catalytic reactors in controlling operating temperatures.
- IC 7588. Fundamentals of Smoke Abatement, by J. F. Barkley. 1950. 34 pp., 2 figs. Revision of IC 7090, Some Fundamentals of Smoke Abatement, issued in 1939; quotes basic ordinance for smoke abatement prepared by representatives of American Society of Heating and Ventilating Engineers, the Stoker Manufacturers Association, the American Civic Association, and the American Society of Mechanical Engineers; model ordinance developed by Smoke Prevention Association; and rules and regulations of Washington, D. C., regarding fuel-burning equipment.
- IC 7589. Mines and Mineral Deposits (Except Fuels), Cascade County, Mont., by Almon F. Robertson. 1951. 81 pp., 11 figs. Although nearly all of the metal mines in Cascade County now are closed and many of them are caved and inaccessible, they yielded more than \$20,000,000 worth of gold, silver, copper, lead, and zinc from 1889 through 1948. Publication describes and gives history of more than 60 mines and prospects studied by Bureau and describes deposits of nonmetallic minerals, including limestone, fire clay, gypsum, bentonite, building stone, and mica.
- IC 7590. Carbon Dioxide Content of Mine-Fire Atmospheres as an Aid When Fighting Metal-Mine Fires, by S. H. Ash. 1950. 25 pp., 7 figs. Shows how to use the carbon dioxide content of mine-fire atmospheres as a gage in fighting metal-mine fires.
- IC 7591. Statistical Data on the Mechanical Cleaning of Bituminous Coal in the United States, by R. L. Anderson. 1951. 14 pp., 5 figs. Quantity of bituminous coal cleaned mechanically in the United States rose from 28,000,000 tons in 1927 to 154,000,000 tons (35 percent of the total production) in 1949. Text, tables, and graphs show the growth of mechanical cleaning by mining methods, by types of equipment, by States, and by wet and pneumatic methods.
- IC 7592. Mines and Mineral Deposits (Except Fuels), Broadwater County, Mont., by Glenn C. Reed. 1951. 62 pp., 19 figs. Describes accessibility, climate, topography, power, freight rates, smelter schedules, production, and geology and gives information on more than 90 metal mines and prospects and a number of nonmetallic deposits in Broadwater County.
- IC 7593. Process Development in the Hydrocarbon Synthesis to 1941, by S. Kodama, W. Funabashi, G. Hashimoto, T. Hirao, H. Tahara, A. Matsumura, J. Kato, and Y. Tarama; revised and edited by Robert C. Grass; translated by Technical Japanese Translation Service. 1951. 41 pp., 37 figs. Discusses pilot-plant equipment used in the synthesis of hydrocarbons; gives detailed descriptions of various plant units, including desulfurizer, converter, and condenser; and includes engineering sketches and photographs of apparatus and plant-flow sheets.
- IC 7594. The Synthesis of Hydrocarbons (Report of the Imperial Fuel Research Institute of Japan, July 25, 1935), by Shigeru Tsutsumi; revised and edited by Robert C. Grass, with preface by Robert C. Grass; translated by Technical Japanese Translation Service. 1951. 60 pp., 8 figs. This paper, among the documents obtained by the United States Naval Technical Mission to Japan between the Japanese surrender in August 1945 and the following December, gives detailed data on research on production of synthetic liquid fuels from coal by the Fischer-Tropsch or gas-synthesis process by the Imperial Fuel Research Institute of Japan between 1932 and 1935; contains brief reviews of research on gas-synthesis process prior to 1935 in Germany, Japan, Great Britain, the United States, and France.

†Out of print.

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- †IC 7595. Safety Consciousness—An Evaluation, by Stanley M. Walker. 1951. 8 pp. Report prepared from accident records studied and observations made during 5 years at the properties of 62 companies in 3 Western, 3 Eastern, and 4 Southern States. Paper presented to the Cement and Quarry Section, National Safety Congress, Chicago, Ill., October 18, 1950.
- IC 7596. Ventilation-Air Heating Plants of the Menominee Range, by Walter E. Lewis. 1951. 9 pp., 6 figs. Heating the ventilating air before it is blown into the mines to prevent icing and closing of air shafts is a common practice in cold winter months at several underground iron-ore mines on the Menominee iron range in Michigan. Two main types of heating plants—hot-air and steam—in use at the Michigan mines, operated by the M. A. Hanna Co., are described. Purpose of report is to cover the operating idea rather than to discuss the technical details of design and air flow.
- †IC 7597. Treatment of Timber, by F. S. Crawford and J. Howard Bird. 1951. 4 pp., 10 figs. Injecting certain chemicals into trees to preserve them from decay offers the mining industry a possible new source of low-cost treated timber for roof support. Report includes description of the chemical impregnation process, with pictures and suggestions for application to mining.
- IC 7598. Use of Visual Aids in the Morenci Branch Safety Program, Phelps Dodge Corp., Morenci, Ariz., by M. L. Williams and Allen D. Look. 1951. 6 pp., 7 figs. Accident rates at the copper mine and reduction plant of the Phelps Dodge Corp., Morenci, Ariz., have dropped sharply since visual aids were adopted in 1945 as a part of the safety education program. Publication describes how the Morenci Branch has employed visual aids with no appreciable increase in the cost of operating the safety department.
- IC 7599. Some Roof-Control Practices in Coal Mines of the United Kingdom, by John W. Buch and Andrew Allan, Jr. 1951. 7 pp., 14 figs. Outlines some of the roof-control problems met in very deep coal mines in the United Kingdom and describes methods used to solve them.
- †IC 7600. Bureau of Mines Approval System for Respiratory Protective Devices, by S. J. Pearce. 1951. 6 pp., 1 fig. Bureau of Mines approval of devices affording protection against breathing gases, dusts, and fumes is based upon performance tests instead of specifications. The tests by which the Bureau determines approval of a given respirator are designed to show if it provides adequate protection for a reasonable time against the hazard for which it was designed, if it is reasonably comfortable and convenient to wear, and if it is constructed of durable materials. Bureau has prepared approval schedules for the following types of respiratory protective devices: (1) Self-contained breathing apparatus, (2) supplied-air respirators, (3) gas masks, (4) dispersoid respirators, and (5) chemical cartridge respirators. Paper presented at Personal Protective Equipment Session of 21st Annual Safety Convention and Exposition of Greater New York Safety Council, New York, N. Y., April 3, 1951.
- IC 7601. Gas Explosions and Their Prevention, by G. S. Scott, R. E. Kennedy, and M. G. Zabetakis. 1951. 13 pp., 2 figs. Explains limits of flammability of various gases and vapors and precautions by which the danger of explosions of gas or vapor can be minimized in industrial plants.
- IC 7602. Mines and Mineral Deposits (Except Fuels), Judith Basin County, Mont., by Almon F. Robertson and Robert N. Roby. 1952. 51 pp., 7 figs. Mining was begun in Judith Basin County in 1879, but most production records only go back to 1920, when Judith Basin County was created from parts of Cascade and Fergus Counties. From 1921 to 1928, inclusive, the county's recorded production of gold, silver, copper, lead, and zinc was worth \$5,946,294. Describes more than 35 metal mines and prospects and some nonmetallic deposits studied by Bureau.
- IC 7603. Ventilating Methods and Safety Measures Used in the Temporary Ventilation of the King Solomon Tunnel, Frisco, Summit County, Colo., by R. L. Bolmer and G. B. Fritts. 1951. 15 pp., 1 fig. Describes the successful use of a portable air compressor to ventilate a mile-long adit for several weeks, and illustrates one method that can be used to make possible the exploration of abandoned mine workings that may contain ore deposits commercial in today's market. Contains detailed information on the methods used for ventilating the King Solomon tunnel and for testing the mine air.
- IC 7604. Analysis of Haulage Fatalities in Bituminous-Coal Mines in 1950, by M. J. Ankeny and D. S. Kingery. 1951. 28 pp. Physical hazards and unsafe practices contributed to about three-quarters of the 121 haulage fatalities in bituminous-coal mines investigated by Bureau in last 10 months of 1950, according to this report analyzing haulage fatalities occurring in 14 States and Alaska. Recommendations for reducing the number of haulage fatalities are included.
- IC 7605. Falls of Roof: The No. 1 Killer in Bituminous-Coal Mines, by J. J. Forbes, T. L. Back, and H. F. Weaver. 1951. 11 pp. Human failure caused 89 percent of the roof-fall fatalities that occurred in bituminous-coal mines in last 10 months in 1950, according to this report based on Bureau investigations of 263 of the 315 fatalities from falls of roof, face, or rib occurring in bituminous-coal mines during the year. Report is arranged with a view to making it as useful as possible to officials of coal companies and mine workers' organizations in planning future accident-prevention programs; to safety instructors, safety directors, inspectors, and supervisors who need data on the specific causes of accidents in order to carry out their duties more effectively; and for discussion at coal-mine safety meetings.
- †IC 7606. Permissible Mine Equipment Approved During the Calendar Year 1950, by H. B. Brunot. 1951. 8 pp. Lists equipment that Bureau approved during 1950 as permissible for use in coal mines. Supplements IO 7432, Permissible Mine Equipment Approved to January 1, 1947, with Appended List of Available Flame-Lamp Fuels, published in 1947, and IC 7569, Permissible Mine Equipment Approved During the Calendar Years 1947-49.
- IC 7607. Mines and Mineral Deposits (Except Fuels), Gallatin County, Mont., by Glenn C. Reed. 1951. 14 pp., 4 figs. Although some gold, silver, and lead have been mined in Gallatin County for past 65 years, mining has played only a small part in the county's economic development, according to a mineral survey of the county by Bureau engineers in 1948. Total mineral production for 1883-1947 was \$308,063, about 98 percent of which consisted of gold and silver produced before 1911. Principal mining enterprises in this county in 1948 were exploitation of limestone deposits at Trident and an asbestos deposit at Karst.
- IC 7608. Allaying Coal Dust During Operation of Continuous-Mining Machines in Utah, by W. M. Merritts and Thomas T. Reay, Jr. 1951. 12 pp., 8 figs. Describes a satisfactory method, developed at the Sunnyside Nos. 1 and 2 mines in Utah, of allaying coal dust created by continuous mining machines. The duty-allaying method fulfilled the recommendations of Federal Mine Safety Code for Bituminous-

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- Coal and Lignite Mines of the United States relating to the control of coal dust, and a district coal-mine inspector of the Industrial Commission of Utah considered that the installation met the requirements of the Utah General Coal Mine Safety Orders.
- IC 7609. Why Men Were Killed at Pennsylvania Anthracite Mines in 1950, by J. J. Forbes and H. F. Weaver. 1951. 13 pp. Human failure caused 71 percent of the 76 fatalities in Pennsylvania anthracite mines investigated by Bureau during last 10 months of 1950. Report describes the accidents in detail and presents suggestions for preventing recurrences.
- IC 7610. Tunnel Construction by Peripheral Sawing at the Fort Randall Reservoir, Pickstown, S. Dak., by Walter E. Lewis. 1951. 21 pp., 32 figs. Describes the peripheral sawing method used in tunnel construction at the Fort Randall Reservoir, on the Missouri River at Pickstown.
- IC 7611. Bench-Scale Studies of the Fischer-Tropsch Synthesis Over Iron, Nickel, and Nickel-Cobalt Catalysts (Japan), by Shiro Watanabe; revised and edited by R. C. Grass; translated by Technical Japanese Translation Service. 1951. 26 pp., 12 figs. Describes laboratory-scale studies, carried out in Japan during World War II, of the use of catalysts other than cobalt in the production of synthetic liquid fuels from coal by Fischer-Tropsch synthesis process.
- IC 7612. Safety in Hoisting at the United Verde Mine, Phelps Dodge Corp., Jerome, Ariz., by Ernest R. Rodriguez and Allen D. Look. 1951. 30 pp., 8 figs. The outstanding safety record in hoisting operations of the United Verde mine in Arizona is attributed to good equipment, adequate maintenance, and proper training of employees, according to this publication describing the mine's safety practices, which are applicable to other deep mines. This copper mine, employing 375 men and operating shafts 3,000 feet deep, has had no fatal hoisting accidents and only 6 lost-time injuries since it was acquired by the Phelps Dodge Corp. in 1885.
- IC 7613. Petroleum Refineries, Including Cracking Plants, in the United States, January 1, 1951, by J. G. Kirby. 1951. 13 pp., 1 fig. Lists capacity of petroleum refineries and cracking plants in the United States on January 1, 1951. Includes tables giving summary of refineries, 1914-51; summary of refineries by States, January 1, 1951; summary of refineries by districts, January 1, 1951; summary of cracking plants, 1925-51; summary of capacity of cracking plants by States, January 1, 1951; and capacity of cracking plants by three principal types and districts, January 1, 1951.
- IC 7614. Froth-Flotation Practice in Coal-Preparation Plants of Western Europe and Great Britain, by B. W. Gandrud, Thomas Fraser, and H. F. Yancey. 1951. 17 pp., 7 figs. Froth flotation for the preparation of fine sizes of coal is employed more widely in Europe and Great Britain than in this country. Circular gives cost and operating data on 3 flotation plants in the Netherlands and on 7 plants in England and Wales and discusses general trends and developments in British and continental froth-flotation practice.
- IC 7615. Roof Bolting and Dust Control, by James Westfield, Floyd G. Anderson, C. W. Owings, John P. Harmon, and Leslie Johnson. 1951. 8 pp., 1 fig. Progress has been made in controlling silica dust, an attendant health menace of roof bolting in the coal-mining industry. Two methods of drilling are used in roof bolting—pneumatic drills and rotary electric drills. Tests were made by Bureau on the collecting efficiencies of the various types of dust control in use in roof drilling.
- IC 7616. Petroleum and Natural-Gas Research Program, Bureau of Mines, Fiscal Year 1950, by R. A. Cattell and others. 1951. 38 pp., 18 figs. Reviews work done by Petroleum and Natural-Gas Branch during fiscal year, including studies of oil and gas development and production, secondary recovery of oil, petroleum chemistry and refining, thermodynamics of petroleum, transportation of natural gas, and helium-tracer studies.
- †IC 7617. Domestic Mica, by G. Richards Gwinn. 1951. 37 pp., 5 figs. Contains a comprehensive survey of domestic mica, including figures on production and consumption, location and description of deposits, and kinds of mica.
- IC 7618. Annual Report of Research and Technologic Work on Coal, Fiscal Year 1950, by Arno C. Fieldner and Sidney Gottley. 1951. 80 pp., 35 figs. Bureau continued its Nation-wide survey of known minable coking reserves, as well as conducting laboratory research to upgrade lower rank coals to metallurgical grade, and at the same time maintained its activities in conservation, mining safety, synthetic fuels, anthracite problems, and related work. Report contains citations of numerous scientific disclosures about experiments, investigations, tests, and explorations, results of which were published in separate form during the fiscal year 1950; however, report incorporates some research data that have not been published elsewhere.
- IC 7619. Significance of Laboratory Tests of Coal and Coke for Combustion, compiled by J. F. Barkley. 1951. 46 pp. This circular, containing a series of papers on the combustion of coal and coke, gives the opinions of highly experienced fuel engineers as to the value, from the standpoint of practical fuel use, of the American Society for Testing Materials laboratory tests on coal and coke and as to how their results can be applied. These papers cover the burning of bituminous coal, anthracite, and coke with different types of fuel-burning equipment.
- †IC 7620. Physiological Aspects of Electrical Accidents in the Coal-Mining Industry, by S. J. Davenport and G. G. Morgis. 1951. 19 pp. This circular, describing physiological aspects of electrical accidents in the coal-mining industry, advises applying artificial respiration at once to save the life of one who has been knocked out by an electric shock. Discusses power-frequency currents affecting human beings, physical reaction to various currents, and treatment for electric shock and gives methods for preventing electric shock.
- †IC 7621. Suggestions for Inspection of Roof-Bolt Installations, by Edward Thomas. 1951. 6 pp. Gives suggestions to assist Federal and State mine inspectors and mining-company safety engineers in determining whether roof-bolting installations are adequate to prevent roof-fall accidents. Roof bolting must be done with a plan, according to this circular.
- IC 7622. Analysis of Haulage Fatalities in Coal Mines, January-June 1951, by M. J. Ankeny and D. S. Kingery. 1951. 14 pp. Gives detailed analysis of fatal haulage accidents in coal mines during first 6 months of 1951, lists causes of accidents in both bituminous and anthracite mines, points out the responsibility for such accidents, and gives recommendations for the prevention of accidents.
- IC 7623. Safety in Milling: Magma Copper Co., Superior, Ariz., by Allen D. Look and Ernest R. Rodriguez. 1951. 4 pp., 11 figs. Many safeguards were incorporated and safe practices instituted to minimize accident hazards in the new concentrator of the Magma Copper Co., Superior, Ariz. Some of these features and practices are described.

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- IC 7624. Minimizing Fire Hazards in Coal Mines by Proper Circuit-Breaker Protection of 250/275 Volt Direct-Current Systems, by F. J. Gallagher. 1951. 11 pp., 6 figs. Some serious fires have occurred in bituminous-coal mines because of short circuits on direct-current power systems that do not have adequate circuit-breaker protection. Results of tests made in 4 coal mines on the effectiveness of circuit-breaker protection on 250/275-volt direct-current systems are given.
- IC 7625. Federal Coal-Mine Inspection—a Decade of Progress. Annual Report for Fiscal Year 1951 and 10-Year Review, by J. J. Forbes, M. J. Ankeny, and H. F. Weaver. 1951. 47 pp., 4 figs. The accomplishments made in the last decade to improve health and safety conditions and practices in the coal-mining industry are presented. During the fiscal year ended June 30, 1951, Federal coal-mine inspectors reported an average of 19 unsafe conditions and practices per mine inspected; 49 percent of the inspection reports issued during the year indicated dangers of a serious nature that were not corrected; and only 27 percent of all the dangers reported by Federal coal-mine inspectors were corrected during the year. More incentives, more safety training, additional technological improvements, and more adequate mining laws are needed to reduce the incidence of coal-mine accidents further.
- IC 7626. Two-way Radio Communication at Santa Rita Open Pit, Kennecott Copper Corp., Santa Rita, N. Mex., by Allen D. Look and L. A. Van Fleet. 1952. 8 pp., 7 figs. Expansion of mining operations brings increasing needs of improved communications to coordinate the mechanized operations that contribute to the efficiency of present-day open-pit methods. Equipment found satisfactory when first installed becomes inadequate as distances and demands increase. Publication records progress made by the Santa Rita open pit in meeting this problem.
- IC 7627. Control of Metallurgical and Mineral Dusts and Fumes in Los Angeles County, Calif., by Glenn L. Allen, Floyd H. Viets, and Louis C. McCabe. 1952. 79 pp., 30 figs. Describes methods that have been found to be effective in reducing air pollution caused by metallurgical and mineral-processing plants in Los Angeles County since the Los Angeles Air-Pollution Control District began functioning early in 1948.
- IC 7628. Modern Automatic Electrically Controlled Elevators for Transporting Men at Two Coal Mines in Western Pennsylvania, by J. W. Holcomb. 1952. 5 pp., 14 figs. Describes automatic electrically controlled elevators installed for transporting men into and out of two western Pennsylvania coal mines and considered a commendable improvement over the conventional coal- and men-hoisting cages in operation at many shaft mines. These elevators, constructed of steel, differ in size and operate in shafts 259 and 307 feet deep.
- IC 7629. Truck Haulage at an Iron Mine in the Adirondack Mountains, N. Y., by Robert S. Sanford. 1952. 7 pp., 6 figs. Describes how the cost of hauling iron ore was reduced by as much as 8 cents per ton through the careful use of specially designed heavy-duty trucks at an open-cut iron mine in the Adirondack Mountains.
- IC 7630. A Quarter Century of Fuel-Oil Sales, 1926-50, by A. T. Coumbe and I. F. Avery. 1952. 100 pp., 4 figs. Contains detailed sales figures for the various grades of oil from 1926 through 1950.
- IC 7631. Mechanical Mining in Some Bituminous-Coal Mines. Progress Report 6. Extraction of Pillars With Mechanized Equipment, by Wilbur A. Haley, Joseph J. Shields, Albert L. Toenges, and Louis A. Turnbull. 1952. 64 pp., 44 figs. Coal recovery in mines where pillars are extracted mechanically ranges from 10 to 50 percent more than in mines operated under similar physical conditions where pillars are not extracted, according to this report, the sixth of a series describing methods and practices of mining coal mechanically. Covering studies endorsed by the Coal Conservation Committee of the National Bituminous Coal Advisory Council, those issued to date contain detailed descriptions of mining operations at 67 coal mines in all the important coal fields in the United States. Descriptions of mines 56 to 67 are included in this report. (See also IC 7527.)
- IC 7632. Hazard of Firing Open, Unconfined Shots in Coal Mines, by M. J. Ankeny. 1952. 4 pp. Describes six major explosion disasters that occurred during the past 24 years in coal mines by firing open, unconfined shots and lists precautions for preventing these explosions.
- IC 7633. Economic Benefits of Systematic Roof Bolting in Ziegler No. 3 Mine, Bell & Zoller Coal & Mining Co., Williamson County, Ill., by L. W. Kelly. 1952. 9 pp., 9 figs. Gives results of a study of roof bolting in the Ziegler No. 3 mine and describes how the operators of this coal mine with one of the most treacherous roofs in the Middle West found it possible to reduce roof-fall accidents drastically and increase production by using systematic roof bolting.
- IC 7634. Production of Manganese Slags for Manufacturing High-Grade Ferromanganese by Blowing Oxidation Spiegeleisen, by Theodore Koots and Jacob Willems, in cooperation with Willy Oelsen and Hanns Wentrup; translated by Roy W. Tindula, with preface by Russell C. Buehl. 1952. 15 pp., 25 figs. Translation of review of work done in Germany to produce a synthetic manganese ore by selective oxidation of manganese from spiegeleisen in converters lined with basic refractories.
- IC 7635. Utilization of Fly Ash, by R. E. Morgan. 1952. 30 pp., 1 fig. Increased use of pulverized-coal firing has created a fly-ash disposal problem to many utility and industrial companies, according to this circular summarizing articles printed in technical and trade journals pertaining to the utilization of fly ash.
- †IC 7636. List of Respiratory Protective Devices Approved by the Bureau of Mines, by S. J. Pearce and L. B. Berger. 1952. 16 pp., 16 figs. Lists respiratory protective devices approved by the Bureau to June 1, 1952.
- †IC 7637. Successful Use of Wooden Roof Bolts in Stony Point Mine, Stony Point Coal Co., Hopkins County, Ky., by L. W. Kelly. 1952. 4 pp., 8 figs. Purpose of circular is to show that, under the conditions prevailing in the Stony Point coal mine, wooden bolts were just as satisfactory as steel bolts or conventional timbering, with a reduction of approximately 80 percent in cost of material. Production records have remained constant with both wooden and steel roof bolts.
- IC 7638. Recommendations For Improved Shuttle-Car-Haulage Safety, by D. S. Kingery. 1952. 10 pp. Gives recommendations that will help coal-mine safety engineers, mine managers, safety committeemen, and supervisory officials in their efforts to prevent shuttle-car accidents at bituminous-coal mines.
- IC 7639. A Practical Method For Teaching Mine Workers and Officials Use of Gas-Detecting Equipment, by D. S. Kingery and F. D. Baker. 1952. 6 pp., 13 figs. A practical and simple method of training men to detect coal-mine gases has been developed by the Bureau, according to this circular describing an experimental training course conducted by the Bureau. The training course was complete with lectures, demonstrations, and practical work and

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- was concluded with an examination showing each trainee's progress.
- IC 7640. Active List of Permissible Explosives and Blasting Devices Approved Before December 31, 1951, by N. E. Hanna and G. H. Damon. 1952. 12 pp. Contains a complete active list of permissible explosives (gelatinous and nongelatinous) and permissible blasting devices approved to December 31, 1951.
- †IC 7641. Industrial Minerals of the Pacific Northwest, by A. J. Kauffman, Jr. 1952. 75 pp. Presents an inventory of the industrial-mineral resources, proved and potential, of the Pacific Northwest, which indicates that each of the States comprising this region annually produces nonmetallic materials valued at many million dollars. Includes bibliography.
- IC 7642. Thickness of Bituminous-Coal and Lignite Seams at All Mines and Thickness of Overburden at Strip Mines in the United States in 1950, by W. H. Young and R. L. Anderson. 1952. 18 pp., 4 figs. More than three-fourths of the coal mined came from seams ranging in thickness from 3 to 7 feet, according to a survey covering bituminous-coal and lignite mines presented in this circular. Seams less than 3 feet thick produced 7.7 percent of the coal in 1950, and seams more than 7 feet thick produced 29.6 percent.
- IC 7643. Petroleum and Natural-Gas Research Program, Bureau of Mines, Fiscal Year 1951, by R. A. Cattell and others. 1952. 46 pp., 17 figs. Reviews work done by Petroleum and Natural-Gas Branch during the fiscal year, including studies of oil and gas development and production, secondary recovery of oil, petroleum chemistry and refining, thermodynamics of petroleum, transportation of natural gas, and helium-tracer studies.
- IC 7644. Natural-Gas Statistics, 1936-50, by D. S. Colby and B. E. Opegard. 1952. 35 pp. Contains tables showing production and consumption of natural gas for each State and one table showing figures for the United States as a whole for 1936-50.
- IC 7645. Natural-Gasoline and Cycle Plants in the United States, January 1, 1952, by D. S. Colby and E. M. Seeley. 1952. 11 pp. Production capacity of natural-gasoline and cycle plants as of January 1, 1952, was 811,596 barrels a day, an increase of 163,691 barrels a day since the last survey on January 1, 1950, according to a biennial survey of the industry presented in this circular. Results of the survey, including types of plants and daily capacities by States, are included.
- †IC 7646. Petroleum Refineries, Including Cracking Plants, in the United States, January 1, 1952, by J. G. Kirby. 1952. 12 pp. Lists capacity of petroleum refineries and cracking plants in the United States on January 1, 1952. Includes tables giving summary of refineries, 1914-52; summary of refineries by States, January 1, 1952; summary of refineries by districts, January 1, 1952; summary of cracking plants, 1925-52; summary of capacity of cracking plants by States, January 1, 1952; and capacity of cracking plants by three principal types and districts, January 1, 1952.
- †IC 7647. Annual Report of Research and Technologic Work on Coal, Fiscal Year 1951, by R. L. Brown and E. P. Carman. 1952. 81 pp., 28 figs. Continuation of the three-phase investigation of known minable reserves of coking coal in the United States and the advancement of research on the production of synthetic liquid fuels and chemicals from coal highlighted the Bureau's research and technologic work on coal during the 1951 fiscal year. At the same time the Bureau carried on its activities in conservation, mining research and safety, coal preparation and analysis, and coal combustion and gasification. Report contains scientific disclosures resulting from the Bureau's experimental research and service work.
- †IC 7648. Ventilating Practices That Minimize Explosion Hazards in Bituminous-Coal Mines, by M. J. Ankeny, James Westfield, and D. S. Kingery. 1952. 6 pp., 8 figs. Recommends ventilating and electrical practices for reducing explosion hazards in coal mines from accumulations of methane gas and presents ventilation and electrical plans that illustrate mining methods and ventilation practices prevailing throughout the bituminous-coal-mining industry.
- IC 7649. Filling With Unclassified Tailing in Modified Cut-and-Fill Stopes, Dayrock Mine, Wallace, Idaho, by Peter H. Toepfer. 1952. 14 pp., 2 figs. Describes a modified cut-and-fill stoping method that has enabled an Idaho metal-mining company to reduce its filling costs from a high of \$6.01 per ton of ore extracted to 67 cents per ton, making it possible to mine ore that was noncommercial under conventional methods. This method, employed at the Dayrock lead mine uses unclassified mill tailings—sands mixed with slimes—to form a densely packed fill relatively impervious to additional water.
- †IC 7650. State Compensatory Provisions for Occupational Diseases, by G. G. Morgis and S. J. Davenport. 1952. 125 pp. Reviews provisions of each State for occupational diseases, including District of Columbia, Hawaii, and Puerto Rico, with a brief history of workmen's compensation laws. Kansas, Louisiana, Mississippi, Oklahoma, and Wyoming do not have legislation covering occupational diseases.
- IC 7651. The Lime Industry, by Oliver Bowles. 1952. 43 pp., 1 fig. History of the lime industry, its raw materials, uses, production, and methods of manufacture are given in this circular, the major part of which is adapted with modifications from IC 6884R, Lime, issued in 1941.
- IC 7652. Roof-bolting the Delaware Aqueduct, by D. H. Platt. 1952. 9 pp., 18 figs. Safer working conditions, a tremendous saving in vitally needed steel, and increased efficiency have resulted from the use of roof bolts in the Delaware aqueduct, according to this circular describing the equipment and methods used to install the roof bolts in this aqueduct.
- IC 7653. Economies Through Roof Bolting in an Indiana Coal Mine, by L. W. Kelly. 1952. 10 pp., 8 figs. Describes how a saving of \$63,221.17 was accomplished by roof-bolting the main west entry of the Kings coal mine in Indiana instead of using the peg-timbering method.
- IC 7654. Underground Storage of Natural Gas in Coal-Mining Areas, by Henry P. Wheeler, Jr., and William E. Eckard. 1952. 11 pp., 4 figs. Describes a survey of the underground storage of gas in the Appalachian region and discusses choosing a field for underground storage and development of a gas-storage field.
- IC 7655. Back Strains in Brickmaking, by F. S. Crawford, E. J. Podgorski, E. W. Felegy, Steve Star, Roy G. Scott, and L. A. Van Fleet. 1953. 14 pp. More suffering, loss of time and wages, and disability probably result from back strains due to manual lifting than any other type of injury, according to this circular describing a study made to find methods of preventing back strains among workers in brick plants.
- IC 7656. Some Factors Affecting and Suggested Ways for Improving Coal-Mine Ventilation. With Particular Reference to Mines in Illinois, Indiana, and Western Kentucky, by C. A. Herbert. 1953. 15 pp., 4 figs. Presents hazards and discusses causes of accumulations of explosive mixtures of methane and air due to inadequate ventilation. A modified

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- plan of room-and-pillar panel mine development for the Central Coal Basin, comprising the coal fields in Illinois, Indiana, and western Kentucky, is suggested, which may eliminate many of the hazards of gas accumulations inherent in the present method of mine development.
- IC 7657. Fuels Consumed for Residential and Commercial Space Heating, 1935-51, by A. T. Coumbe and I. F. Avery. 1953. 10 pp., 2 figs. Statistical survey, covering competitive fuels consumed for heating of residential and commercial buildings, shows the relative changes in the demands for the different fuels for the years 1935 to 1951.
- IC 7658. National First-Aid and Mine Rescue Contest, Columbus, Ohio, October 2, 3, and 4, 1951, by W. H. Tomlinson. 1953. 71 pp., 6 figs. Describes the fourteenth National First-Aid and Mine Rescue Contest, the first in 21 years, held at the State fairgrounds, Columbus, Ohio, in October 1951, under the auspices of the Bureau and the Joseph A. Holmes Safety Association. Fourteen teams from 6 States participated in the mine rescue contest; 55 teams from 9 States competed in the first-aid contest; and 1 team entered as a combination team, participating in both the mine rescue and first-aid contests.
- IC 7659. Petroleum and Natural-Gas Research Program, Bureau of Mines, Fiscal Year 1952, by R. A. Cattell and others. 1953. 46 pp., 15 figs. Reviews work done by Petroleum and Natural Gas Branch during the fiscal year, including studies of oil and gas development and production, secondary recovery of oil, petroleum chemistry and refining, thermodynamics of petroleum, and transportation of natural gas.
- IC 7660. Convertol Process of Coal-Slurry Treatment, by Thomas Fraser. 1953. 4 pp., 3 figs. Describes a new method, called the Convertol process, of cleaning and dewatering coal-washery slurries to recover a clean coal product. The process oil, all of which is retained in the clean coal product, adds to the coking power of the coal and facilitates the production of briquets. The process was developed in Germany.
- IC 7661. Coal-Mine Explosions and Coal- and Metal-Mine Fires in the United States in 1950, 1951, and 1952, by W. J. Fene and H. B. Humphrey. 1953. 13 pp., 2 figs. Gives summary of mine explosions, by States and causes; causes of explosions; explosion fatalities, by causes; causes of explosions of electrical origin; explosions in bituminous-coal mines; and mine fires.
- IC 7662. Fire-Fighting Equipment in Coal Mines—Selection, Placement, and Care, by W. D. Walker, Jr., William Bathorne, S. P. Polack, and C. M. Keenan. 1953. 20 pp. Outlines standards that will help coal-mine operators select, place, and care for fire-fighting equipment in coal mines and suggests minimum requirements for fire protection underground.
- IC 7663. Annual Report of Research and Technologic Work on Coal and Related Investigations, Fiscal Year 1952, by R. L. Brown and W. H. Ode. 1953. 67 pp., 24 figs. Report, based largely on publications issued, including some unpublished data, summarizes Bureau of Mines research and technologic work on coal and related investigations for the fiscal year.
- IC 7664. Boron Nitride, by A. A. Giardini. 1953. 13 pp., 4 figs. Describes methods used by investigators from 1842 through 1952 for the synthesis of boron nitride and contains the physical and chemical properties of boron nitride. Includes bibliography.
- IC 7665. Organizations With Programs Beneficial to Coal-Mine Employees, by W. D. Walker, Jr., and S. P. Polack. 1953. 20 pp. Lists agencies that have services designed to encourage miners to take an active part in accident-prevention programs and summarizes their services.
- IC 7666. Review of Literature on Health Hazards of Metals. 1. Copper, by Sara J. Davenport. 1953. 114 pp. First in a series reviewing literature on health hazards of metals, report deals with copper, one of the first metals used by man.
- IC 7667. Petroleum Refineries, Including Cracking Plants, in the United States, January 1, 1953, by J. G. Kirby. 1953. 12 pp. Includes tables giving capacity of petroleum refineries and cracking plants in the United States on January 1, 1953; summary of refineries, 1914-53; summary of refineries by districts, January 1, 1953; summary of refineries by States, January 1, 1953; summary of cracking plants, 1925-53; summary of capacity of cracking plants by districts, January 1, 1953; summary of capacity of cracking plants by States, January 1, 1953; and capacity of cracking plants by three principal types and districts, January 1, 1953.
- IC 7668. Vermiculite, by O. S. North and H. P. Chandler. 1953. 27 pp. Because vermiculite expands or exfoliates under heat, it has advanced from a mineral curiosity to a 15-million-dollar-a-year industry, used primarily as an insulating material and lightweight aggregate, with a wide range of other applications, according to this report describing the mining, milling, and exfoliation of this mineral. Mineralogy and properties, geologic occurrence and origin, and domestic and foreign deposits are discussed.
- †IC 7669. Uranium-Mining Operations of the Utex Exploration Co. in the Big Indian District, San Juan County, Utah, by Charles A. Steen, George P. Dix, Jr., Scott W. Hazen, Jr., and Russell B. McLellan. 1953. 13 pp., 10 figs. Tells how a mine of the Utex Exploration Co. on the Mi Vida claim in the Big Indian mining district became one of the major producers of uranium ore in 4 months; describes the exploration and development work done at the mine and the mining methods used.
- IC 7670. Drainage and Utilization of Firedamp, by J. Venter and P. Stassen. 1953. 22 pp., 27 figs. To acquaint the American coal-mining industry with the progress that has been made in Europe and Great Britain on the drainage and utilization of firedamp, circular discusses the origin, nature, and release of firedamp, drainage techniques, drainage of firedamp in European countries and Great Britain, and use and transport of firedamp.
- IC 7671. Crude-Oil and Refined-Products Pipeline Mileage in the United States, January 1, 1953, by A. T. Coumbe and I. F. Avery. 1953. 10 pp., 1 fig. From 1950 through 1952 the petroleum-pipeline industry used 1,962,000 tons of steel in laying 23,145 miles of new pipe, according to this circular summarizing the total mileage change in petroleum pipelines for the 3 years.
- IC 7672. Regeneration of Spent Pickle Liquor, by B. P. Martinez. 1953. 18 pp., 4 figs. Describes a process proposed for regenerating spent pickle liquor in which some of the water is evaporated at atmospheric pressure and ferrous sulfate is precipitated as monohydrate crystals.
- IC 7673. The Development of Permissible Requirements for Safe Underground Diesel Haulage, by M. A. Elliott and R. S. James. 1953. 12 pp. Gives performance tests and requirements that have been developed by the Bureau to assure safe operation of diesel-powered haulage equipment approved as permissible for underground use.

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- IC 7674. Safe Storage, Handling, and Use of Commercial Explosives in Metal Mines, Nonmetallic Mines, and Quarries (Revision of Information Circular 7380), by D. Harrington and J. H. East, Jr. 1954. 28 pp., 12 figs. Mainly promotes the safe use of explosives in the mineral industries; discusses characteristics of ordinary types of explosives used in industry; and outlines safe practices expected to help make storage, handling, and use of explosives less hazardous to persons and property.
- IC 7675. Raw Materials for Aluminum Production, by D. D. Blue. 1954. 11 pp. Discusses probable requirements and sources of raw materials for large-scale expansion of primary aluminum production. Materials discussed are those that are consumed in the production process.
- IC 7676. Danger From Carbon Monoxide in the Home, by L. B. Berger and H. H. Schrenk. 1954. 6 pp. (Revision of IC 7238.) Emphasizes the dangers of carbon monoxide and suggests safeguards against this hazard.
- †IC 7677. Recommendations on the Prevention and Suppression of Dust in Mining, Tunneling, and Quarrying. Adopted at a Meeting Held Under the Auspices of the International Labor Office, Geneva, Switzerland, December 1-17, 1952. 1954. 16 pp. Presents recommendations for preventing and suppressing dust in mining, tunneling, and quarrying operations. These recommendations were adopted at a meeting of technical experts held under auspices of International Labor Office in Geneva, Switzerland, December 1-17, 1952. Participating in the meeting were government agencies, management and labor, and research, education, and insurance organizations—all concerned with measures for protecting workers from breathing harmful dusts while working—from Australia, Austria, Belgium, Canada, Chile, France, Germany, India, Italy, the Netherlands, Norway, Peru, Sweden, Switzerland, Union of South Africa, United Kingdom, and United States.
- †IC 7678. Roof Bolting in Alabama Coal Mines and Iron-Ore Mines, by H. C. Young. 1954. 15 pp., 35 figs. Deals with roof bolting in Alabama coal mines and iron-ore mines from May 1948, when it was introduced as a systematic method of roof support in mines of Tennessee Coal & Iron Division of United States Steel Corp., until May 1953.
- IC 7679. Names and Definitions of Regions, Districts, and Subdistricts in Alaska (Used by the Bureau of Mines in Statistical and Economic Studies Covering the Mineral Industry of the Territory), by Alfred L. Ransome and William H. Kerns. 1954. 91 pp., 16 figs. Names and definitions of regions, districts, and subdistricts used by Bureau in statistical and economic studies of mineral industries in Alaska are given. Purpose of report is to present to mineral industry and to those individuals interested in mineral or allied industries in Alaska the system used by Bureau in connection with its legal function of collecting and disseminating mineral statistics. Descriptions given should result in a more complete understanding of what is meant by regional and district names that appear in publications of Bureau of Mines relative to the mineral industry of the Territory.
- IC 7680. Methods and Costs of Sinking a Shaft Through a Fractured, Water-Bearing Formation at Friedensville, Pa., by Warren Hastings, F. J. Kane, and F. D. Wright. 1954. 18 pp., 24 figs. Describes methods and costs, in terms of labor, power, and materials, of sinking a 7-compartment vertical shaft 1,261 feet through a fractured, water-saturated formation at Friedensville.
- IC 7681. A Survey of the Literature on the Extractive Metallurgy and Electrolytic Refining of Bismuth, by P. M. Gruzensky and W. J. Crawford. 1954. 12 pp. Presents a survey of the literature covering extraction of bismuth from raw materials, its separation from lead, and its subsequent refining. Fifty-two reports are discussed briefly, including several on use of aqueous, nonaqueous, and fused electrolytes in electrolytic refining of bismuth.
- IC 7682. Accepted Limit Values of Air Pollutants, by J. F. Barkley. 1954. 6 pp. Presents information on accepted maximum permissible concentrations of air pollutants from standpoints of health, damage to vegetation, damage to property, and requirements of industrial processes, assembled by author as part of work of serving as Chairman of Subcommittee 3, Health and Industrial Requirements, of American Society of Mechanical Engineers' Committee on Air-Pollution Controls.
- IC 7683. Hydraulic Air Compressors, by Leroy E. Schulze. 1954. 38 pp., 41 figs. This review of the development of the hydraulic air compressor was made to assemble details and construction pictures of various hydraulic air-compressor installations in United States, Canada, Germany, Sweden, and England. Includes reports of tests made on some of the compressors.
- IC 7684. A Third of a Century of LP-Gas Sales, 1922-52, by A. T. Coumbe and I. F. Avery. 1954. 17 pp., 1 fig. Presents information on LP-gas sales, 1922-52, in tables by principal uses, States, and districts, and includes a table showing exports of LP-gas, 1928-52, by countries.
- IC 7685. Administration of the Federal Coal Mine Safety Act, by James Westfield, H. F. Weaver, and C. M. Keenan. 1954. 76 pp. Covers first complete calendar year of operations under Federal Coal Mine Safety Act and reviews activities of Coal-Mine Inspection Branch of Health and Safety Division of Bureau. (See also IC 7734, 7765, 7795, 7833, and 7902.)
- IC 7686. Some Useful Applications of Zirconium, by J. M. McClain and R. W. Nelson. 1954. 7 pp., 39 figs. Throughout the various processing steps necessary to the production of zirconium, there are many corrosive atmospheres, solutions, and conditions that made the Kroll process useful for testing practical applications of zirconium. Report describes experimental and production applications of zirconium at Northwest Electrodevelopment Laboratory, Albany, Ore. It cites 18 applications in hydrochloric acid, 4 in sulfuric acid, 5 in phthalic-hydrochloric acid, 3 in wet hydrogen chloride-chlorine atmospheres, and 2 in fused caustic.
- IC 7687. Review of Literature on Health Hazards of Fluorine and Its Compounds in the Mining and Allied Industries, by S. J. Davenport and G. G. Morgis. 1954. 55 pp. Summarizes published material from 1887 to 1954 on health hazards of fluorine and its compounds in mineral industries. Report includes physical and toxic properties of 73 fluorine compounds, arguments for and against fluoridated public water supplies, and discussions of toxic effects of fluorine on plants, animals, and human beings and hazards of hydrogen fluoride, with prevention and control of exposures to this substance and first-aid measures. Includes bibliography.
- IC 7688. Black Hills Mineral Atlas, South Dakota (in Two Parts). Part 1, by Bureau of Mines staff, Region V. 1954. 123 pp., 4 figs. Summarizes all available data on mines and mineral deposits in the Black Hills in South Dakota. Atlas makes possible a determination of general potentialities of Black Hills region and provides basic information

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- necessary for detailed study of a given property or commodity. Report covers Lawrence and Mead Counties and parts of Butte and Pennington Counties. (See also IC 7707.)
- IC 7689. Inspection and Testing of Mine-Type Electrical Equipment for Permissibility (Revision of Information Circular 7185), by L. C. Ilsey, E. J. Gleim, and H. B. Brunot. 1954. 23 pp., 6 figs. Discusses theory upon which tests of equipment in explosive atmospheres are based and considers inspection and other matters pertaining to investigations made by Bureau in ascertaining whether a machine merits approval.
- IC 7690. Selenium, by J. D. Sargent. 1954. 25 pp., 3 figs. Revised as IC 7715.
- †IC 7691. Technology of Lignitic Coals (in Two Parts). Part 1. Summary of Industrial Development Possibilities; European Technology on Lignitic Coals; Occurrence and Properties; Lignite Mining in North Dakota; Preparation; Storage and Transportation; Appendix—Statistics and Costs of Lignite in North Dakota, by Bureau of Mines staff, Grand Forks, N. Dak., and Washington, D.C. 1954. 142 pp., 39 figs. Covers technology of European lignitic coal, statistics on production and costs of North Dakota lignitic coals, their occurrence and properties, mining, preparation, storage, and transportation. (See also IC 7692.)
- †IC 7692. Technology of Lignitic Coals (in Two Parts). Part 2. Combustion—Power Generation; Carbonization; Gasification; Hydrogenation; Other Chemical Processing, by Bureau of Mines staff, Grand Forks, N. Dak., and Washington, D.C. 1954. 120 pp., 26 figs. Covers utilization of lignite. (See also IC 7691.)
- †IC 7693. Petroleum Refineries, Including Cracking Plants in the United States, January 1, 1954, by J. G. Kirby. 1954. 12 pp. Although number of operating petroleum refineries decreased from 343 to 337 during 1953, the total daily capacity increased 368,236 barrels. Included are tables giving capacity of petroleum refineries and cracking plants in United States on January 1, 1954; summary of refineries by years, 1914–54; summary of refineries by districts, January 1, 1954; summary of refineries by States, January 1, 1954; summary of cracking plants by years, 1925–54; summary of capacity of cracking plants by districts, January 1, 1954; summary of capacity of cracking plants by States, January 1, 1954; and capacity of cracking plants by three principal types and districts, January 1, 1954.
- IC 7694. It Couldn't Happen (a Description of Five Unusual Fatal Mine Accidents), by D. S. Kingery. 1954. 12 pp., 5 figs. Describes five fatal bituminous-coal-mine accidents so unusual in occurrence that they may never be duplicated. Publication illustrates that everyone working underground is subjected, at all times, to definite inherent mining hazards and that safety devices, though provided, often are ineffective or not used. Safety planning with continuous study can prevent these unusual accidents, as well as routine recurring types.
- IC 7695. Laboratories That Make Fire Assays, Analyses, and Tests of Ores, Minerals, Metals, and Other Inorganic Substances, by B. R. Klahold. 1954. 20 pp. (Revision of IC 7523.) Lists laboratories where mineral samples may be sent for identification and special tests to determine their value.
- †IC 7696. Mechanical Mining in Some Bituminous-Coal Mines. Progress Report 7. Methods of Mining With Continuous-Mining Machines, by J. J. Shields, M. O. Magnuson, W. A. Haley, and J. J. Dowd. 1954. 118 pp., 66 figs. Discusses continuous mining—a system of mining in which a machine is used to cut and load coal in one continuous operation without drilling and blasting the coal—as it applies to the room-and-pillar system of mining. Tells how continuous-mining equipment is used in mining bituminous coal in 20 mines in Alabama, Illinois, Kentucky, Ohio, Pennsylvania, and West Virginia, plans of mining devised for use of such equipment, and how results attained compare with conventional-mining methods where both methods are in use at the same time. (See also IC 7014, 7527, 7631, and 7813.)
- IC 7697. Review of the Ammonia Industry and Its Application to North Dakota, by L. F. Heising. 1954. 64 pp., 16 figs. Summarizes pertinent data on manufacture and use of synthetic ammonia products and gives condensed summary of potentialities of a synthetic ammonia industry in North Dakota for Federal, State, and private organizations that may be interested in helping to develop an integrated synthetic ammonia and fertilizer industry.
- IC 7698. Mining With a Dosco Continuous Miner on a Longwall Face, by R. W. Stahl and J. J. Dowd. 1954. 11 pp., 6 figs. Describes operation of the Dosco continuous miner and discusses possible use of machines of this type on longwall faces in flat-lying coal beds.
- IC 7699. Report of Research and Technologic Work on Coal and Related Investigations, July 1, 1952, to December 31, 1953, by R. L. Brown and E. P. Carman. 1954. 102 pp., 31 figs. Eighteenth in a series, report summarizes Bureau's research and technologic work on coal, from July 1, 1952, to December 31, 1953, which was directed toward developing and encouraging increased conservation and more efficient use of our mineral fuel resources through more efficient and safer mining methods and improved methods of preparing and utilizing these fuels.
- IC 7700. Natural-Gasoline and Cycle Plants in the United States, January 1, 1954, by D. S. Colby and L. V. Harvey. 1954. 10 pp. Production capacity of natural-gasoline and cycle plants as of January 1, 1954, was 926,000 barrels a day, an increase of 114,000 barrels a day since last survey on January 1, 1952, according to a biennial survey of the industry presented in this circular. Gives results of survey, including types of plants and daily capacities by States.
- IC 7701. Recommended Standards for Installation and Maintenance of Haulage Roads, by D. S. Kingery and T. F. Curry. 1954. 30 pp., 11 figs. Contains recommendations for installation and maintenance of track haulage roads that will help mine operators to reduce haulage accidents.
- IC 7702. Central Mine Rescue Station, The Cleveland-Cliffs Iron Co. Mather Mine B Shaft, Negaunee, Mich., by Roy G. Stott, E. O. Pynnönen, and John A. Johnson. 1954. 17 pp., 12 figs. Describes how The Cleveland-Cliffs Iron Co. provides fire-fighting and mine rescue facilities for its underground iron-ore mines on Marquette and Menominee iron ranges in Michigan. Included are descriptions of company's central mine rescue station at Mather mine B shaft, its equipment, and type of training provided by the company.
- IC 7703. Testing for Methane in Out-of-Reach Places, by M. L. Davis. 1954. 9 pp., 4 figs. Describes device used for testing for methane in out-of-reach places and gas-testing methods that are safe and reliable. Adoption of the methods suggested should at least minimize recurrence of gas explosions, consequently save lives and prevent injuries.
- IC 7704. A Network Analyser for Solving Mine-Ventilation-Distribution Problems, by G. E. McElroy. 1954. 13 pp., 6 figs. Describes an electrical analog that reduces materially the time required to

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- evaluate alternative mine-ventilation-distribution systems by conventional mathematical methods.
- IC 7705. Supplemental Bibliography on Investment and Operating Costs for Chemical and Petroleum Plants, by E. E. Harton, and P. R. Tisot. 1955. 67 pp. Supplements IC 7516. To aid plant managers in making estimates of investment and operating costs of petroleum refining and chemical processes, bibliography contains index for equipment, plant, and process investment and operating costs and presents abstracts of publications cited in the index from September 1948 through June 1952. Work done in cooperation with University of Wyoming. (See also IC 7751 and 7884.)
- IC 7706. Chrysotile-Asbestos Deposits of Arizona, by L. A. Stewart. 1955. 124 pp., 43 figs. Describes chrysotile-asbestos deposits of Arizona—only known sources on the American continent of naturally low-iron chrysotile spinning fiber that is needed for electric-cable coverings—and discusses mining methods. (See also IC 7745.)
- IC 7707. Black Hills Mineral Atlas, South Dakota (in Two Parts). Part 2, by Bureau of Mines staff, Region V. 1955. 208 pp., 4 figs. Publication is second part of a comprehensive mineral atlas summarizing information on mines and mineral deposits in the Black Hills in South Dakota. The atlas makes possible a determination of the general potentialities of the Black Hills region and provides basic information necessary for detailed study of a given property or commodity. Circular covers Custer County and parts of Pennington and Fall River Counties. (See also IC 7688.)
- IC 7708. Coal-Mine Hazards From Overlying Gasoline Pipelines: Description of Gasoline Explosions in Two Pennsylvania Bituminous-Coal Mines, by W. D. Walker, Jr., and J. H. Dumire. 1954. 14 pp., 2 figs. Describes two ignitions of gasoline vapor that occurred in underground bituminous-coal mines in Pennsylvania after gasoline had leaked from overlying pipelines into the mines. Included are recommendations for safety of personnel of underground mines operated under gasoline pipelines.
- IC 7709. Graph of Components in Gibbsite-Kaolinite-Type Bauxite, by G. C. Branner. 1955. 9 pp., 2 figs. Presents a bauxite diagram that clarifies, by graphic means, the theoretical chemical constituents of gibbsite-kaolinite-type bauxite for all possible proportions of these two minerals from pure gibbsite to pure kaolinite and contains tables that reflect the same data. The diagram, with accompanying interpretations and use formulas, will be useful to those connected with mining and processing of bauxite.
- IC 7710. National First-Aid and Mine Rescue Contest, Fort Wayne, Ind., September 29 and 30 and October 1, 1953, by R. G. Warncke. 1955. 82 pp., 10 figs. Describes the National First-Aid and Mine Rescue Contest, the second in 21 years, held in Allen County Memorial Coliseum, Fort Wayne, Ind., under auspices of Bureau and Joseph A. Holmes Safety Association. Fourteen teams from 6 States participated in the mine rescue contest, and 47 teams from 9 States in the first-aid contest. Three of the teams entered as combination teams, participating in both mine rescue and first-aid contests.
- IC 7711. Investigation of Accident Involving Titanium and Red Fuming Nitric Acid, December 29, 1953, by P. M. Ambrose, J. C. Barrett, R. W. Huber, David Schlain, and V. C. Petersen. 1955. 34 pp., 27 figs. Describes an accident which occurred while stress-corrosion tests were being conducted on spot-welded titanium samples in red fuming nitric acid in Bureau's College Park, Md., Station, on December 29, 1953. Included are results of corrosion tests involved in the accident as well as those carried out before the accident, and a discussion on behavior of titanium in red fuming nitric acid.
- IC 7712. 100-Percent Cooperative First-Aid Training, Mines and Quarries, Colorado Fuel & Iron Corp., Colorado and Wyoming, by A. C. Moschetti and G. B. Fritts. 1955. 10 pp., 2 figs. Describes a program in which labor, management, two States, and Bureau cooperated in giving all personnel of 6 mines and quarries of Colorado Fuel & Iron Corp. the Bureau's first-aid course. They were the Morley, Frederick, and Allen coal mines and Monarch limestone and Canon dolomite quarries in Colorado and Sunrise iron ore mine in Wyoming.
- IC 7713. Catalog of Recorded Exploration Drilling and Mine Workings in the Tri-State Zinc-Lead District, Missouri, Kansas, and Oklahoma—Interim Report, by L. C. Brichta and E. T. Perkins. 1955. 24 pp., 7 figs. Designed to provide a continuing record of available drill-hole logs and maps of mine developments in the zinc-lead district in Missouri, Kansas, and Oklahoma, publication describes the standard mapping and indexing systems, with mapping progress to May 1, 1954.
- IC 7714. Frost-Control Practices and the Prospective Use of Anthracite, by J. D. Clendenin. 1955. 45 pp., 5 figs. Discusses extent of frost-control practices in 11 States and describes an investigation of the possibilities of using Pennsylvania anthracite as fuel in supplying heat to prevent or control frost damage in orchards, nurseries, and truck farms.
- IC 7715. Selenium Data (Revision of Information Circular 7690), by J. D. Sargent. 1955. 29 pp., 3 figs. Gives physical and chemical properties, geology, mineralogy, consumption, domestic and foreign production, metallurgy, and uses of selenium. Includes bibliography.
- IC 7716. Preventing Coal-Mine Fires Caused by Electrical Equipment, by C. L. Brown. 1955. 20 pp., 5 figs. Presents results of studies of electric-power-distribution systems of four coal mines, showing how each system could be improved. Includes descriptions of coal-mine power-distribution systems and electrical equipment and gives seven common methods of providing adequate protection against short circuits.
- IC 7717. Petroleum and Natural-Gas Research Program, Bureau of Mines, Fiscal Year 1953, by R. A. Cattell and Others. 1955. 76 pp., 23 figs. Summarizes petroleum work of Bureau in fiscal year 1953. Includes studies of oil and gas development and production, secondary recovery of oil, petroleum chemistry and refining, thermodynamics of petroleum, and transportation of natural gas.
- IC 7718. Ringelmann Smoke Chart (Revision of IC 6888), by Rudolf Kudlich; revised by L. R. Burdick. 1955. 3 pp., 1 fig. Discusses development and history of Ringelmann smoke chart, a standard guide often used in developing and enforcing smoke-control regulations, and describes its use. Chart gives shades of gray by which the density of smoke from stacks may be compared.
- IC 7719. Slate, by Oliver Bowles. 1955. 12 pp. Discusses origin and character of slate, its composition, structures, properties, uses, domestic and foreign deposits, and mining and milling methods.
- IC 7720. Memorial Stone, by Oliver Bowles. 1955. 6 pp. Describes composition and physical properties of granite and marble and discusses qualities required for memorial stone.
- IC 7721. A Study of the Tungsten Potential in Boulder County, Colo., by Carl Belser. 1955. 39 pp., 17 figs. Indicated and inferred reserves of ferberite ore are estimated at 699,573 tons or 358,742 units, according to this report on the tungsten potential of Boulder County. Describes mine development and

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mining methods and discusses ore-dressing and concentration techniques.

- IC 7722. Permissible Mine Equipment Approved During the Calendar Years 1953-54, by R. A. Kearns and H. B. Brunot. 1955. 12 pp. Supplements B 543. Lists equipment Bureau approved during 1953 and 1954 as permissible for use in underground mines. (See also IC 7840.)
- IC 7723. A Survey of the Literature on the Electrodeposition of Molybdenum, by T. T. Campbell and A. Jones. 1955. 6 pp. Covers use of aqueous, non-aqueous, and fused-salt systems for the electrowinning or electroplating of molybdenum metal.
- IC 7724. Petroleum Refineries, Including Cracking Plants in the United States, January 1, 1955, by J. G. Kirby. 1955. 12 pp. Summarizes refinery and cracking plant capacities by States, districts, types, and years from 1914 to 1955 and lists changes in crude oil capacity by districts from January 1, 1954, to January 1, 1955.
- IC 7725. Conversion Tables for Fluorescent X-ray Spectroscopy, by William J. Campbell and John G. Parker. 1955. 79 pp. Contains seven spectral tables by which chemical analysis of elements can be made by identification of characteristic X-ray spectral lines. In fluorescent X-ray spectroscopy, the characteristic X-rays of atoms are emitted or fluoresced upon absorption of primary or incident X-rays of shorter wavelengths (higher energies).
- IC 7726. Uranium Mining on the Colorado Plateau, by W. L. Dare, R. A. Lindblom, and J. H. Soulé. 1955. 60 pp., 35 figs. First of a series describing uranium mining on the Colorado plateau, report, designed for persons interested in uranium but not familiar with mining, discusses equipment and methods used in prospecting, exploration, development, and mining. Includes descriptions of Colorado plateau and its geology and history of uranium mining in the area. Written in cooperation with Atomic Energy Commission engineers.
- IC 7727. Frictional Ignition of Gas by Mining Machines, by Irving Hartmann. 1955. 17 pp. Gives measures for preventing frictional ignition of gas in coal mines by mining machines and reviews ignitions and explosions caused by friction in United States, Great Britain, and Germany.
- IC 7728. Equipment for Analyzing Mine Atmospheres, With Special Reference to Haldane-Type Apparatus, by E. A. Watson and L. B. Berger. 1956. 51 pp., 9 figs. (Revision and combination of IC 7017 and 7441.) Describes methods and equipment used in sampling mine air to detect harmful gases, with detailed information about the Haldane-type apparatus and its operation; includes results of recent study of the accuracy attainable with Haldane-type apparatus in the determination of methane, which is encountered in many coal mines.
- †IC 7729. Marketing Sheet Mica, by Robert D. Thomson. 1955. 20 pp., 1 fig. This report, designed to assist producers in understanding the complexities of marketing muscovite sheet mica, discusses physical defects, preparation, and marketing.
- IC 7730. National Survey of Burner-Fuel Oils, 1955, by O. C. Blade. 1955. 20 pp., 1 fig. First in a series of national burner-fuel-oil surveys conducted in cooperation with American Petroleum Institute at request of Oil-Heat Institute of America and petroleum industry, publication gives data submitted by 35 petroleum refining companies on 341 samples of the 6 grades of burner-fuel oil marketed.
- IC 7731. Tungsten Potential in the San Juan Area, Ouray, San Juan, and San Miguel Counties, Colo., by Carl Belser. 1956. 18 pp., 4 figs. Indicated and inferred reserves of tungsten ore for 13 properties in the San Juan area are estimated at 72,000 tons or 97,585 units. Describes tungsten deposits in three counties.
- IC 7732. Health and Safety Activities of the Bureau of Mines, Fiscal Year 1955, by James Westfield. 1956. 21 pp., 12 figs. Presents activities and accomplishments of Bureau of Mines for safety and health in the mineral industries during the 12-month period.
- IC 7733. Survey of Dust-Control Practices in the Coal-Mining Industry, by R. W. Barnes, M. J. Gregory, C. W. Owings, and L. B. Berger. 1956. 49 pp., 9 figs. Gives results of survey by Bureau to determine the extent to which dust-control practices are being used in coal-mining industry and their effectiveness. Survey covered 3,413 bituminous-coal and lignite mines and 169 anthracite mines.
- IC 7734. Administration of the Federal Coal-Mine Safety Act, Calendar Year 1954, by James Westfield, H. F. Weaver, and C. M. Keenan. 1956. 73 pp. Covers second year of operations under Federal Coal-Mine Safety Act and reviews activities of the Division of Coal-Mine Inspection. (See also IC 7685.)
- IC 7735. Methods and Operations at the Kaiser Steel Corp. Eagle Mountain Iron Mine, Riverside County, Calif., by R. R. Trengove. 1956. 25 pp., 14 figs. Describes open-pit mining methods and operations at the Kaiser Steel Corp. Eagle Mountain iron-ore mine, which provides about 2½ million tons of ore a year for the blast furnaces of the corporation's steel plant at Fontana, Calif.
- IC 7736. Permissible Mining-Loading Equipment, by H. B. Brunot. 1956. 33 pp., 13 figs. Describes briefly design and operation of 30 continuous mining machines approved as permissible by Bureau to January 1, 1955.
- IC 7737. National Annual Diesel-Fuel Survey, 1955, by O. C. Blade. 1955. 24 pp., 5 figs. Sixth in a series of national diesel-fuel surveys issued by Bureau in cooperation with American Petroleum Institute. Gives data on 312 samples of diesel fuel contributed to Bureau by 46 companies who reported their tests on their own products, including class or classes of service for which the fuels are recommended. In some instances, a fuel has been designated for use only in winter or summer.
- IC 7738. Limestone and Dolomite, by Oliver Bowles. 1956. 29 pp., 4 figs. Gives information on the origin and occurrence of limestone and dolomite, chief production centers, major uses, and methods of quarrying and preparing stone for market.
- IC 7739. International Cooperation in Reducing Mine Hazards, by E. J. Gleim. 1956. 15 pp. Reviews Eighth International Conference of Directors of Safety in Mines Research held at Dortmund-Derne, Germany, 1954, to discuss results of studies made in different countries to improve health and safety conditions underground, including information relating to safety in coal mines obtained from visits to mining experiment stations in Germany, Belgium, France, and England.
- IC 7740. Reconnaissance of the "Red Bed" Copper Deposits in Southeastern Colorado and New Mexico, by John H. Soulé. 1956. 74 pp., 39 figs. Describes location and general features of the "Red Bed" or sandstone copper deposits in southeastern Colorado and in 16 New Mexico counties and methods and results of mining operations carried on in the area.
- IC 7741. Drill-Dust Collectors Approved by the Bureau of Mines as of January 31, 1956, by C. W. Owings, F. G. Anderson, J. P. Harmon, L. Johnson, and L. B. Berger. 1956. 25 pp., 17 figs. Lists 38 dust-collecting devices, used in connection with rock

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- drilling in coal mines, that have been approved as of January 31, 1956, and describes briefly requirements and procedure for approval. Nine manufacturers of approved dust collectors are listed.
- IC 7742. Safety in Pneumatic Drilling and Related Blasting Operations: Opencut Mine, Morenci Branch, Phelps Dodge Corp., Morenci, Ariz., by E. R. Rodriguez and A. D. Look. 1956. 23 pp., 7 figs. Describes improvements in safety and efficiency resulting from changes made in drilling equipment and drilling methods at the Phelps Dodge Corp. opencut copper mine in Arizona, including the changes made, and safe practices in related blasting and scaling operations. Presents codes of safe practice which employees of the company are required to observe.
- IC 7743. Mining Methods and Costs at the Morning Mine, American Smelting & Refining Co., Shoshone County, Idaho, by John R. Reynolds. 1956. 40 pp., 18 figs. Supplement IC 6238 and 6587. Describes mining and milling methods at the Morning lead-silver-sinc mine, and contrasts two periods, 1939 and 1951, in the history of the mine that were considerably different in economic conditions.
- IC 7744. Analysis of 346 Accidents. Underground Iron-Ore Mines, Lake Superior District, by R. O. Pynnonen, R. G. Stott, J. B. Stepan, and J. A. Johnson. 1956. 15 pp., 5 figs. Gives results of a study of 346 accidents in underground iron-ore mines for a 5-year period. These accidents caused 354 lost-time injuries, including 28 fatalities and 2 permanent-total disabilities.
- IC 7745. Chrysotile-Asbestos Deposits of Arizona (Supplement to Information Circular 7706), by L. A. Stewart. 1956. 41 pp., 12 figs. Describes 18 additional asbestos properties in Arizona—only known sources on the American continent of naturally low-iron chrysotile spinning fiber needed for electric-cable coverings.
- IC 7746. National Motor Gasoline Survey, Summer 1955, by O. C. Blade. 1956. 24 pp., 3 figs. Octane ratings of regular- and premium-price gasolines sold at filling stations in the United States during the summer of 1955 are higher than those of the preceding winter and those of the summer of 1954. Based on company-made tests of gasolines collected during June, July, and August from cities in 17 marketing areas of the United States, this survey included 4,857 samples. Work done in cooperation with American Petroleum Institute.
- IC 7747. National Annual Survey of Aviation Fuels, 1955, by O. C. Blade. 1956. 15 pp., 5 figs. Survey of aviation fuels, based on data furnished by 20 manufacturers of aviation gasoline, includes analyses for 116 samples of aviation gasoline, of which 34 are for commercial use only, 24 for military use only, and 58 for commercial and military use. Data supplied by 16 producers of aviation jet fuel also are presented for 28 samples. Work done in cooperation with American Petroleum Institute.
- IC 7748. Tungsten Potential in Chaffee, Fremont, Gunnison, Lake, Larimer, Park and Summit Counties, Colo., by Carl Bealer. 1956. 31 pp., 10 figs. Total inferred reserves of tungsten ore for 20 properties in Colorado are estimated at 45,919 tons containing 0.81 percent tungsten trioxide or 37,192 units, not including the reserves of the Climax molybdenum mine of the Climax Molybdenum Co., where tungsten is recovered only as a byproduct. Describes tungsten-bearing areas in seven counties.
- IC 7749. Safety Aspects of Controls and Operations of Belt Conveyors in Coal Mines, by C. L. Brown. 1956. 15 pp., 8 figs. Describes safer methods for installing and operating conveyor belts in coal mines to combat the growing hazard of underground fires; also emphasizes need for adequate roof support over conveyor belts.
- IC 7750. Waterflooding of Oil Sands in Butler and Greenwood Counties, Kans., by J. P. Powell. 1956. 42 pp., 18 figs. Describes 3 waterflooding projects in Butler County—Morrison Producing Co. Fox-Bush project, Cities Services Oil Co. El Dorado Shallow-sand project, and Tide Water Associated Oil Co. Blankenship project—and 1 project in Greenwood County—Ohio Oil Co. Bryden-Ladd project. Gives brief history, methods employed, and results obtained in barrels of oil produced as a result of the waterflooding. Work done in cooperation with Kansas State Board of Health.
- IC 7751. Bibliography of Investment and Operating Costs for Chemical and Petroleum Plants, Supplement 2 (July 1952-June 1954), by E. E. Harton, Jr. 1956. 127 pp., Supplements IC 7516 and 7705. To aid plant managers in making estimates of investment and operating costs of petroleum refining and chemical processes, bibliography contains index for equipment, plant, and process investment and operating costs and presents more than 600 abstracts of publications cited in the index from July 1952 through June 1954. Work done in cooperation with University of Wyoming. (See also IC 7847 and 7884.)
- IC 7752. Ceramic Industry Development and Raw-Material Resources of Oregon, Washington, Idaho, and Montana, by Hal J. Kelly, Karle G. Strandberg, and James I. Mueller. 1956. 77 pp., 16 figs. Describes a survey of the ceramic raw-material resources in the four Pacific Northwest States, including annual production, some operating costs, and annual power consumption for the important plants. Work done in cooperation with School of Mineral Engineering, University of Washington.
- IC 7753. Granite as Dimension Stone, by Oliver Bowles. 1956. 18 pp., 3 figs. Discusses granites marketed as dimension stone. Includes descriptions of its physical and chemical properties, principal deposits, quarry methods, and finishing processes.
- IC 7754. Outlook and Research Possibilities for Bituminous Coal, by Bureau of Mines in cooperation with Bituminous Coal Research, Inc. 1956. 52 pp., 5 figs. Gives results of a survey of current research on bituminous coal and studies made to determine additional research projects that would be valuable to the coal industry. Lists 209 possibilities for research on all phases, from mining to possible new markets, that might enable the industry to participate more fully in Nation's growing fuels market.
- IC 7755. Rock Dusting and Sampling, Including Wet Rock Dusting, at the Bureau of Mines Experimental Coal Mine, by Irving Hartmann and James Westfield. 1956. 13 pp., 3 figs. Describes rock-dust sampling methods and gives facts and fallacies regarding the action of rock dust and the development of mine explosions, rock-dust requirements in coal mines, and results of tests to determine effectiveness of wet rock dusting.
- IC 7756. Research and Technologic Work on Coal and Related Investigations, 1954, by E. P. Carman and D. L. Caldwell. 1956. 80 pp., 22 figs. Nineteenth in a series, report summarizes Bureau research and technologic work on coal for the year, which was directed toward developing and encouraging increased conservation of coal resources through safer and more efficient mining, preparation, and utilization. Significant advances were made in these fields, particularly in coal-mine safety and in preparation and utilization of the various ranks of coals.

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- †IC 7757. Safety with Solvents, by H. B. Humphrey and Genevieve Morgis. 1956. 25 pp., 5 figs. Discusses ways to work safely with dangerous solvents, such as gasoline, benzene, acetone, and carbon tetrachloride. Also lists the hazards to which persons using them may be exposed and recommending safety measures.
- IC 7758. Block Caving at Kelley Mine, The Anaconda Co., Butte, Mont., by C. C. Popoff. 1956. 102 pp., 65 figs. Describes block caving, a mining method in which each block of ore is undercut so that it caves by gravity, at the Kelley copper mine. Part I discusses deposits, engineering problems encountered, and mine facilities; part II presents principles used in design and development and standard operating procedures.
- IC 7759. Block-Caving Methods at the Sunrise Mine, Platte County, Wyo., by F. L. Wideman. 1956. 30 pp., 16 figs. Describes mining methods at the Sunrise underground iron-ore mine, discussing in detail block-caving system now employed.
- IC 7760. Dust Control in Mining, Tunneling, and Quarrying in the United States, by C. W. Owings. 1956. 38 pp., 5 figs. Summarizes and reviews literature published or abstracted in 1953 and 1954 concerning dust prevention and suppression, including unpublished information to outline current practices for those interested in dust control in and around mines, tunnels, and quarries; discusses briefly prevention and suppression of airborne dusts and points out problems involved.
- †IC 7761. Petroleum Refineries, Including Cracking Plants in the United States, January 1, 1956, by J. G. Kirby. 1956. 12 pp. Summarizes refinery and cracking plant capacities by States, districts, types, and years from 1914 to 1956 and lists changes in crude oil capacity by districts from January 1, 1955, to January 1, 1956.
- IC 7762. National Survey of Burner Fuel Oils, 1956, by O. C. Blade. 1956. 24 pp., 1 fig. Second in a series of national burner-fuel-oil surveys conducted in cooperation with American Petroleum Institute at request of Oil-Heat Institute of America and petroleum industry, publication gives data submitted by 45 petroleum refining companies on 427 samples of 5 of the 6 grades of burner-fuel oil marketed.
- IC 7763. National Motor Gasoline Survey, Winter 1955-56, by O. C. Blade. 1956. 26 pp., 3 figs. Octane ratings of regular- and premium-price gasolines sold at filling stations in the United States during the winter of 1955-56 reached a new high, this report discloses. Based on company-made tests of gasolines collected during December 1955 and January and February 1956 from cities in 17 marketing areas of the United States, survey included 4,954 samples. Tables show upward trend of octane ratings over the years. Work done in cooperation with American Petroleum Institute.
- IC 7764. National First-Aid and Mine Rescue Contest, Knoxville, Tenn., October 10, 11, and 12, 1955, by W. H. Tomlinson. 1956. 83 pp., 16 figs. Describes the National First-Aid and Mine Rescue Contest, the third after a lapse of 21 years, held in the Administration Building, Chilhowee Park, Knoxville, Tenn., under auspices of Bureau and Joseph A. Holmes Safety Association. Nine teams from 5 States participated in the mine rescue contest, and 54 teams from 8 States in the first-aid contest. Two of the teams entered as combination teams, participating in both mine rescue and first-aid contests.
- IC 7765. Administration of the Federal Coal-Mine Safety Act, Calendar Year 1955, by James Westfield, H. F. Weaver, and C. M. Keenan. 1956. 71 pp. Covers third year of operations under Federal Coal-Mine Safety Act and reviews activities of the Division of Coal-Mine Inspection. (See also IC 7685.)
- IC 7766. Mining Methods and Costs, Standard Uranium Corp., Big Buck Mine, San Juan County, Utah, by W. L. Dare and R. R. Durk. 1956. 51 pp., 23 figs. Describes mining methods, equipment and costs at the Big Buck uranium-vanadium ore mine on the Colorado Plateau. This large underground mine could begin shipping ore 7 months after development began.
- IC 7767. Potential of Heavy-Mineral-Bearing Alluvial Deposits in the Pacific Northwest, by A. J. Kauffman, Jr., and K. D. Baber. 1956. 36 pp. Describes alluvial deposits in Idaho, Montana, Oregon, and Washington and outlines technology and uses of the heavy minerals found in them. Deposits contain recoverable quantities of chromite, ilmenite, magnetite, zircon, monazite, columbite-tantalite, and radioactive blacks.
- IC 7768. Sampling Deep Ore Deposits by Rotary Drilling and Methods of Surveying and Controlling the Direction of Drill Holes, by Russell R. Trengove and A. C. Johnson. 1956. 15 pp., 8 figs. Describes successful use of a rotary drill rig to explore a lead-silver-gold ore deposit 2,000 feet below the surface at property of Eureka Corp., Eureka, Nev. The softness and friability of this ore made it impossible to obtain core samples by diamond drilling. A whipstock and directional surveying instruments, which control the direction and deviation of the holes, made it possible to obtain ore samples within a 200-foot zone from the original hole.
- IC 7769. Crude-Oil and Refined-Products Pipeline Mileage in the United States, January 1, 1956, by A. T. Coumbe and I. F. Avery. 1956. 8 pp. Includes tables breaking down pipeline mileage by States, by diameter of pipe, and by products handled, presenting these data separately for trunk lines and gathering lines.
- IC 7770. A Reconnaissance of Sulfur Resources in Wyoming, Colorado, Utah, New Mexico, and Arizona, by F. L. Wideman. 1957. 61 pp., 16 figs. Describes deposits of sulfur ore and other sources of the element. Sources of sulfur occurring within the region are sulfur ore, pyrite, and pyritic ore, and natural gas and petroleum containing hydrogen sulfide.
- IC 7771. Bibliography of Zirconium, by Eleanor Abshire. 1957. 281 pp. This bibliography, the most comprehensive one compiled on zirconium, is result of a cooperative project by Bureau of Ships, Department of the Navy, and Bureau of Mines to accumulate literature on zirconium and hafnium and to establish an information center at Bureau's Albany, Oreg., station for any interested research organization or library. Included are almost 1,000 abstracts of reports and over 600 United States and foreign patents. (See also IC 7830.)
- IC 7772. Safety Plan at Ray Mines Division, Kennecott Copper Corp., Ray, Ariz., by Allen D. Look and M. L. Williams. 1957. 19 pp., 4 figs. The safety program, known as the Master Safety Plan, adopted by Ray Mines Division, Kennecott Copper Corp., has resulted in a substantial reduction of injuries over a 3-year period—1952, 1954, and 1955—according to this report. The safety plan incorporates lessons learned during the more than 40 years the safety program at the Ray and Hayden, Ariz., plants has been conducted and is flexible enough to permit changes in operation of the plan as need arises. The National Safety Council gave the Ray Mines Division the Award of Honor for its safety performance during 1955.
- IC 7773. Sodium Sulfate Deposits Along the Southeast Shore of Great Salt Lake, Salt Lake and Tooele

†Out of print.

- Counties, Utah, by Stephen R. Wilson and Frank L. Wideman. 1957. 10 pp., 4 figs. Describes occurrence of sodium sulfate in Salt Lake and Tooele Counties, presents data on sampling, and describes extraction and refining of raw material and a mining research project that has been conducted on the deposits.
- IC 7774. Mining Methods and Costs at the Westside Mine of the Eagle-Picher Co., Cherokee County, Kans., by S. S. Clarke. 1957. 20 pp., 9 figs. Describes mining methods and costs at the Westside zinc-lead ore mine in the Tri-State district (Missouri-Kansas-Oklahoma). Work done in cooperation with the Eagle-Picher Co.
- IC 7775. Use of Prestressed Precast Shaft Supports, Banner Mine, Lordsburg, N. Mex., by Allen D. Look and Ludlow G. Anderson. 1957. 15 pp., 14 figs. Describes installation of prestressed, precast concrete shafts supports in 100 feet of shaft at the Banner mine, which gave a satisfactory permanent installation in a section of shaft that had given trouble with conventional timbering. Permanent supports can cut the hazards, costs, and delay incident to replacement of conventional timbers, especially where subject to decay.
- IC 7776. National Annual Diesel-Fuel Survey, 1956, by O. C. Blade. 1957. 22 pp., 3 figs. Seventh in a series of national diesel-fuel surveys issued by Bureau in cooperation with American Petroleum Institute. Gives data on 329 samples of diesel fuel contributed to Bureau by 49 companies who reported their tests on their own products, including class or classes of service for which the fuels are recommended. In some instances, fuels are designated for use only in winter or summer.
- IC 7777. Storage and Cataloging of Drill Core by the Bureau of Mines, by James E. Hill. 1957. 24 pp., 5 figs. Two core libraries—one at Minneapolis, Minn., and the other at Denver, Colo.—will store drill cores obtained from mineralized areas during exploratory work by Bureau of Mines and private mining companies over past several years. The cores are valuable guides to underground formations and can be consulted readily by geologists, mining engineers, and others concerned with development and utilization of mineral resources.
- IC 7778. Review of Coal Supplies and Requirements in Western European and Soviet Bloc Countries, 1955 and 1956, by George D. Drechsler, C. R. Gentile, George Markon, and J. J. Liammari. 1957. 44 pp. European demand for coal from United States will rise and may increase in the next 20 years, according to this report presented in 4 sections, which includes a discussion of present and future fuels and energy position in Europe, summaries of energy requirements and capabilities of individual free European countries, a description of coal supply and requirements in Soviet Bloc countries, and a statistical section.
- IC 7779. National Motor Gasoline Survey, Summer 1956, by O. C. Blade. 1957. 28 pp., 3 figs. Octane ratings of regular- and premium-price gasolines sold at filling stations in the United States during summer of 1956 are higher than those of preceding winter and those of summer of 1955. Based on company-made tests of gasolines collected during June, July, and August from cities in 17 marketing areas of the United States, this survey included 4,457 samples. Work done in cooperation with American Petroleum Institute.
- IC 7780. Mining and Milling Methods and Costs, Tri-State Zinc, Inc., Jo Daviess County, Ill., by W. A. Cole. 1957. 19 pp., 6 figs. Describes operating methods and costs at the Gray zinc-lead mine, which is of special interest because it is highly mechanized and employs diesel trucks to haul ore from stoping areas through inclined adits to the mill.
- IC 7781. Mining Methods and Costs at the Hayden Creek Mine of St. Joseph Lead Co., St. Francois County, Mo., by Marvin E. Lane. 1957. 33 pp., 14 figs. Describes mining methods and costs at the Hayden Creek lead mine. In contrast with most operations in the Lead Belt mining district, all underground haulage is trackless and the ore body was outlined by drilling before a shaft was sunk. Work done in cooperation with St. Joseph Lead Co.
- IC 7782. National Annual Survey of Aviation Fuels, 1956, by O. C. Blade. 1957. 16 pp., 5 figs. Survey of aviation fuels, based on data furnished by 20 manufacturers of aviation gasolines, including analyses for 120 samples of aviation gasoline, of which 46 are for commercial use only, 24 for military use only, and 50 for commercial and military use. Data supplied by 17 producers of aviation jet fuels also are presented for 38 samples. Work done in cooperation with American Petroleum Institute.
- IC 7783. Methods and Costs of Deepening the Crescent Shaft, Bunker Hill & Sullivan Mining & Concentrating Co., Kellogg, Shoshone County, Idaho, by E. B. Olds and E. W. Parsons. 1957. 19 pp., 8 figs. Describes methods and costs of deepening a 3-compartment underground shaft 2,000.5 feet in the Crescent lead-zinc mine.
- IC 7784. Molybdenum. A Materials Survey, by Wilmer McInnis, with a chapter on Geology and Resources by S. C. Creasey. 1957. 77 pp., 15 figs. Molybdenum, one of the more versatile alloying elements in modern metallurgy, occurs in nature only in combination with other elements, according to this publication discussing practically every phase of the molybdenum industry, including supply and demand, mining methods and metallurgy, production, uses, and exports and imports. Survey was prepared with cooperation of Geological Survey for the Office of Defense Mobilization. 75 cents.
- IC 7785. Studies on the Development and Control of Coal-Dust Explosions in Mines, by Irving Hartmann. 1957. 27 pp., 9 figs. Reviews Bureau's research on coal-dust explosions, summarizing results of recent and current studies in Bureau's experimental coal mine and listing pertinent studies by European mine-safety-research organizations.
- IC 7786. Mining Methods and Practices at the Mineral Hill Copper Mine, Banner Mining Co., Pima County, Ariz., by Walter R. Storms and Allan B. Bowman. 1957. 25 pp., 14 figs. Describes mining methods and practices at the Mineral Hill copper mine, which was reopened in 1951 after having been closed 30 years. Work done in cooperation with Banner Mining Co.
- IC 7787. Some Recent Developments in Waterflooding in Washington County, Okla., 1956-57, by J. P. Powell. 1957. 35 pp., 16 figs. Describes 5 waterflooding projects in Washington County—3 in Wayside field, 1 in Bartlesville-Dewey field, and 1 in Hogshooter field—where specially treated water is pumped underground to force oil toward producing wells. Four of these projects are pilot operations, and fifth is a full-scale project with an area of 325 acres. Work done in cooperation with State of Oklahoma.
- IC 7788. Mining Methods and Practices at the Johnson Camp Copper-Zinc Mine, Coronado Copper & Zinc Co., Cochise County, Ariz., by W. R. Hardwick and Joe Sierakoski. 1957. 27 pp., 17 figs. Describes mining methods and practices at the Johnson Camp copper-zinc mine; includes brief description of the milling practice.
- IC 7789. State Regulations Pertaining to the Use of Internal-Combustion Engines Underground, by J. C. Holtz and E. J. Gleim. 1957. 24 pp. Includes abstracts of State laws and regulations of 36 States

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- as they affect use of internal-combustion engines underground, particularly diesel engines.
- IC 7790. Natural-Gasoline and Cycling Plants in the United States, January 1, 1956, by I. F. Avery and L. V. Harvey. 1957. 11 pp. Production capacity of natural-gasoline and cycling plants as of January 1, 1956, was 46.4 million gallons a day, an increase of 7.5 million gallons a day since last survey on January 1, 1954, according to a biennial survey of the industry presented in this circular. Gives results of survey, including types of plants and daily capacities by States. 15 cents.
- IC 7791. Titanium. A Materials Survey, by Jesse A. Miller. 1957. 202 pp., 40 figs. One of a series designed primarily to provide fundamental information on strategic and critical materials to Government officials responsible for National Security, this publication covers every phase of the titanium industry, including consumption and uses, geology, resources, mining, processing, fabrication, structure of the industry, supply and distribution, marketing, research and development, and public policy and national defense. Survey was prepared with cooperation of Geological Survey for the Office of Defense Mobilization. \$1.00.
- IC 7792. Bureau of Mines Approval System for Respiratory Protective Devices (Revision of I.C. 7600), by S. J. Pearce. 1957. 6 pp., 1 fig. Bureau of Mines approval of devices affording protection against breathing gases, dusts, and fumes is based upon performance tests instead of specifications. The tests by which Bureau determines approval of a given respirator are designed to show whether it provides adequate protection for a reasonable time against the hazard for which it was designed, is reasonably comfortable and convenient to wear, and is constructed of durable materials.
- IC 7793. Mining Methods and Costs at the Sunbright Limestone Mine, Foote Mineral Co., Sunbright, Va., by Thaddeus B. Evans and N. A. Eilertsen. 1957. 44 pp., 20 figs. Describes mining methods and costs at the Sunbright limestone mine; tells how mine was begun as an open pit and then was converted to an underground room-and-pillar operation.
- IC 7794. Report of Bureau of Mines Research and Technologic Work on Coal and Related Investigations, 1955, by E. P. Carman, M. R. Geer, and H. L. Riley. 1957. 103 pp., 22 figs. Twentieth in a series, report summarizes Bureau research and technologic work on coal, which was directed toward promoting conservation of coal resources through safer and more efficient mining, improved preparation, and more effective utilization, during the year.
- IC 7795. Administration of the Federal Coal-Mine Safety Act, Calendar Year 1956, by James Westfield, H. F. Weaver, and C. M. Keenan. 1957. 69 pp. Covers fourth year of operations under Federal Coal-Mine Safety Act and reviews activities of Division of Coal-Mine Inspection. (See also IC 7685.)
- IC 7796. National Motor Gasoline Survey, Winter 1956-57, by O. C. Blade. 1957. 32 pp., 3 figs. Octane rating of regular- and premium-price gasolines sold at filling stations in the United States during winter of 1956-57 reached a new high, this report discloses. Based on company-made tests of gasolines collected during December 1956 and January and February 1957 from cities in 17 marketing areas of United States, this survey included 4,608 samples. Work done in cooperation with American Petroleum Institute.
- IC 7797. The Use of a Nonionic Detergent and Citric Acid for Improving Cleanout Procedures of Water-Input Wells in Secondary Oil-Recovery Projects, by T. R. Johansen, J. P. Powell, and H. N. Dunning. 1957. 18 pp., 9 figs. Describes tests made to increase efficiency of cleanout procedures of water-input wells in waterflooding projects by using a nonionic detergent and citric acid. Work done in cooperation with State of Oklahoma.
- IC 7798. Injury Experience in the Metal and Non-metal Industries, 1954. Detailed Analysis of Safety Factors and Related Employment Data; and Unpublished Statistics for 1943-53, by John C. Machisak, Naomi W. Kearney, and Elizabeth Dixon. 1957. 56 pp., 2 figs. Presents data on fatal and nonfatal injuries and employment in metal and nonmetal mines for 1954 and for 1943-53, by States for the year, and historical data on employment and injury experience for United States and Alaska during 1911-54. Circular is first publication containing statistical data on injuries at metal and nonmetal mines and related plants since Bulletin 461 was issued in 1945.
- IC 7799. Peat in the United States, by Eugene T. Sheridan and Joseph A. DeCarlo. 1957. 25 pp., 8 figs. Peat, used chiefly in agriculture and horticulture, is one of this country's most abundant natural resources, according to this publication containing economic and statistical data on this commodity. Discusses origin, properties, reserves, production, consumption, and uses of peat.
- IC 7800. Mining, Processing, and Costs—Idaho Almaden Mercury Mine, Washington County, Idaho, by Margaret R. Lickes. 1957. 33 pp., 27 figs. Detailed evaluation, careful planning, and use of low-cost open-pit mining have restored Idaho Almaden mercury mine to profitable operation, according to this report discussing open-pit mining operations, furnacing plant, and costs at the mine.
- IC 7801. Mining Methods and Costs, Continental Uranium, Inc., Continental No. 1 Mine, San Juan County, Utah, by W. L. Dare. 1957. 20 pp., 11 figs. One of a series on methods and costs of mining uranium on Colorado Plateau, report describes methods used at Continental No. 1 mine where 12 men produced 1,650 tons of uranium ore in 1 month.
- IC 7802. Physical Properties of Low-Boiling Phenols. A Literature Survey, by Clarence Karr, Jr. 1957. 15 pp. Lists physical properties for 183 low-boiling phenols.
- IC 7803. Mining Methods and Costs—La Sal Mining & Development Co., La Sal Uranium Mine, San Juan County, Utah, by W. L. Dare and D. T. Delicate. 1957. 48 pp., 23 figs. One of a series on methods and costs of mining uranium on Colorado Plateau, report describes methods used at La Sal mine.
- IC 7804. Report of Research and Technologic Work on Explosives, Explosions, and Flames, Fiscal Years 1953 and 1954, by Ruth F. Brinkley and Robert W. Van Dolah. 1957. 127 pp., 70 figs. Summarizes fundamental research and technical studies conducted by Bureau between July 1, 1952, and June 30, 1954. Report covers explosive research, flammability of gases and vapors, dust-explosion investigations, and combustion research.
- IC 7805. Bibliography on Extractive Metallurgy of Nickel and Cobalt, January 1929-July 1955, by R. B. Bauder. 1957. 159 pp. Reviews chemical literature on nickel and cobalt from January 1929 to July 1955. Work done in cooperation with University of Alabama. (See also IC 7883.) 70 cents.
- IC 7806. Use of Lignin Sulfonate for Dust Control on Haulage Roads in Arid Regions, by John P. Harmon. 1957. 12 pp., 11 figs. Describes use of lignin sulfonate, a byproduct of paper mills, at open-pit mining operations to control road dust and to improve road surfaces.
- IC 7807. Mining and Milling Methods and Costs, Ozark Ore Co. Iron Mountain Iron-Ore Mine, St. Francois County, Mo., by Robert F. Pettit, Jr.

- Willis A. Calhoun, and Burton M. Reynolds. 1957. 46 pp., 20 figs. Describes mining and milling methods and costs at Iron Mountain iron-ore mine. This mine is notable for its successful transition from an open-pit development to a highly mechanized underground operation.
- IC 7808. Auxiliary and Supplemental Mine Rescue Equipment, by W. Dan Walker, Jr., G. W. Chastain, and D. D. Dornenburg. 1957. 50 pp., 22 figs. (Revision of IC 7413.) Apparatus recently approved by Bureau only as auxiliary and capable of being worn in hazardous atmospheres for periods of  $\frac{1}{2}$  and  $\frac{3}{4}$  hour are as follows: Chemox oxygen breathing apparatus made by Mine Safety Appliances Co.; Scott Air-Pak  $\frac{1}{2}$ -hour breathing apparatus made by Scott Aviation Corp.; and M.S.A. compressed-oxygen and compressed air  $\frac{1}{2}$ -hour breathing apparatus, also made by Mine Safety Appliance Co. These apparatus are described, and instructions are given for their care and use.
- IC 7809. Making Ventilation-Pressure Surveys With Altimeters, by G. E. McElroy and D. S. Kingery. 1957. 20 pp., 9 figs. Discusses method of using altimeters for pressure surveys in mine-ventilation systems and presents methods of making surveys and calculating results.
- IC 7810. Recommended Safety Standards for Shaft Sinking. 1957. 21 pp. Presents recommended safety standards for sinking mine shafts. The standards cover fire prevention; fire protection; sanitation; electricity; explosives storage and transportation; timbering and safeguarding personnel and equipment; hoisting, hauling, and handling excavated material; ventilation; drilling; blasting; welding and burning; and lighting.
- IC 7811. Mining Methods and Costs, Calyx Nos. 3 and 8 Uranium Mines, Temple Mountain District, Emery County, Utah, by W. L. Dare. 1957. 36 pp., 19 figs. One of a series on methods and costs of mining uranium on Colorado Plateau, report describes methods used at Calyx Nos. 3 and 8 mines.
- IC 7812. Thickness of Bituminous-Coal and Lignite Seams at all Mines and Thickness of Overburden at Strip Mines in the United States in 1955, by W. H. Young and R. L. Anderson. 1957. 11 pp., 1 fig. Survey of 7,856 coal mines shows that the average thickness of coal seams mined in United States decreased 2 inches between 1950 and 1955 to an average of 62 inches, which also is 3 inches less than the 65 inches in 1945. The drop in seam thickness was attributed to operations of strip mines, which can work thinner seams economically, and to increased output in areas mining thinner beds by underground methods.
- IC 7813. Mechanical Mining in Some Bituminous-Coal Mines. Progress Report 8. Methods and Equipment Used in Underground Development, by J. J. Shields, J. J. Dowd, and W. A. Haley. 1957. 66 pp., 32 figs. Eighth in a series on methods and practices used in mining bituminous coal mechanically, report describes methods and equipment used in development work at 14 underground bituminous-coal mines in West Virginia, Pennsylvania, Kentucky, and Ohio. (See also IC 7696.)
- IC 7814. Phosphate Rock (in Two Parts). 1. Mining, Beneficiation, and Marketing, by E. Robert Ruhlman. 1958. 33 pp., 9 figs. First of two circulars on phosphate rock, an essential fertilizer material and important to the chemical industry, contains general information on mining, beneficiating, and marketing of the material.
- IC 7815. Petroleum Refineries. Including Cracking Plants in the United States, January 1, 1957, by J. G. Kirby. 1957. 13 pp. Summarizes refinery capacity by years from 1914 to 1957 and by districts and types on January 1, 1957, and cracking plant capacity by years from 1925 to 1957 and by types, districts, and States on January 1, 1957; also lists changes in crude oil capacity by districts from January 1, 1956, to January 1, 1957, 20 cents.
- IC 7816. Oven-Coke Plants in the United States as of December 31, 1956, by Joseph A. DeCarlo and Maxine M. Otero. 1958. 6 pp. Survey of the oven-coke industry described in this circular shows that 79 plants were operating in 22 States on December 31, 1956, with 15,923 serviceable ovens with an annual maximum capacity of nearly 80 million net tons. Coal-chemical materials produced at each installation also are listed. 15 cents.
- IC 7817. Peat Producers in the United States That Reported Production in 1956, by Eugene T. Sheridan and Maxine M. Otero. 1958. 8 pp. Twenty-third annual survey of the peat industry by the Bureau reveals that 75 producers in 17 States reported commercial production of peat in 1956, with Florida the principal peat-producing State. 15 cents.
- IC 7818. Packaged-Fuel Plants in the United States That Reported Production in 1956, by Eugene T. Sheridan and Maxine M. Otero. 1958. 3 pp. Twenty-second annual survey of the packaged-fuel industry by the Bureau shows that the operating plants decreased from 60 in 1946 to 26 in 1956 and that packaged-fuel was manufactured chiefly from low-volatile bituminous coal in 1956. 10 cents.
- IC 7819. Fuel-Briquetting Plants in the United States That Reported Production in 1956, by Eugene T. Sheridan and Maxine M. Otero. 1958. 4 pp. Survey of the fuel-briquet industry shows that 21 fuel-briquet plants were operating in 11 States, with Wisconsin having the largest number of operating plants. 10 cents.
- IC 7820. Beehive-Coke Plants in the United States That Reported to the Bureau of Mines in 1956, by Joseph A. DeCarlo and Emma E. Ryan. 1958. 6 pp. Survey of beehive-coke plants shows there were 61 in 1956. Of these, 44 with 6,920 ovens were active during the year and 17 with 2,629 ovens were idle. 15 cents.
- IC 7821. Mechanism of the Synthesis of Hydrocarbons From Carbon Monoxide and Hydrogen; translated by Paul Levinson; edited by Ernst M. Cohn; from the Russian report of Y. T. Eldus. 1958. 15 pp. Presents results of research by Soviet Russia of the Fischer-Tropsch synthesis process of making fluid fuels from coal. 15 cents.
- IC 7822. Discovery and Development of the Pima Copper Deposit, Pima Mining Co., Pima County, Ariz., by R. E. Thurmond and W. R. Storms. 1958. 19 pp., 8 figs. Describes the discovery, exploration, and development of the Pima copper deposit.
- IC 7823. Mining Methods and Costs at the Rialto Mine, Nellie B. Division, American Zinc, Lead & Smelting Co., Ottawa County, Okla., by W. F. Netzeband. 1958. 23 pp., 11 figs. Describes cost-cutting mechanized operations employed in the Rialto zinc-lead mine; contains cost information for all phases of operations and illustrations depicting mining equipment and methods.
- IC 7824. Spodumene—Major Source of Lithium, by James S. Browning. 1958. 20 pp., 2 figs. Production of lithium minerals had increased approximately 36,503 short tons by 1954, according to this publication which summarizes the reserve, mining, processing, and consumption situation pertaining to spodumene, the main source of lithium. Principal known reserves of spodumene are in North Carolina and South Dakota. Work done in cooperation with University of Alabama.
- IC 7825. Bibliography of Bureau of Mines Investigations of Coal and Its Products, 1950 to 1955, by E. P. Carman and Frances S. Bayes. 1958. 135 pp. Supplements TP 576, 639, and 698, and B 528. Lists

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a thousand reports by members of the Bureau (including those published by the Bureau, by journals of various societies, and by the technical and trade press). Indexed by subjects and authors.

- IC 7826. Roof-Bolt Recovery in the Middle West, by L. W. Kelly. 1958. 17 pp., 5 figs. Describes methods employed at 12 coal mines in Illinois, Indiana, and Kentucky for recovering roof bolts from mined-out areas for reuse in active sections.
- IC 7827. Cathodic Protection for Earth-Buried Pipelines and Other Metal Structures, by J. Howard Bird and A. Z. Dimitroff. 1958. 27 pp., 15 figs. Cathodic protection using either galvanic or electrolytic anodes has proved effective in preventing corrosive action and could be used to protect many metal structures in the mineral industry, according to this publication, which discusses grounding mediums and phases of grounding related to corrosion and cathodic protection.
- IC 7828. Mining and Water-Control Methods at the Chief Lead-Zinc Mine, Chief Consolidated Mining Co., Juab County, Utah, by W. E. Young. 1958. 21 pp., 11 figs. Describes methods used to control large volumes of water at Chief lead-zinc mine; includes methods of mining and costs.
- IC 7829. Marble, by Oliver Bowles. 1958. 31 pp., 4 figs. Discusses properties of marble, distribution of domestic and foreign deposits, methods and equipment used in quarrying and milling, economic and marketing problems, and recent advances in marble technology.
- IC 7830. Bibliography of Zirconium. Supplement to Information Circular 7771, by Eleanor Abshire. 1958. 216 pp. This bibliography, the result of a cooperative project by the Bureau of Ships, Department of the Navy, and Bureau of Mines to accumulate literature in the Zirconium Information Center at Bureau's Albany, Oreg., station for any interested research organization or library, is second in a series that covers current technical literature relating to metallurgy of zirconium. Included are over 800 abstracts of reports and over 60 United States and foreign patents.
- IC 7831. Four Waterflooding Projects in Cowley County, Kans., 1958, by J. P. Powell, J. L. Eakin, K. H. Johnston, and C. H. Riggs. 1958. 27 pp., 9 figs. Discusses four waterflooding projects in Cowley County—Stelbar Oil Corp., Inc., Rock Pool unit, Cooperative Refinery Association Rock Unit 3, Anderson-Prichard Oil Corp. Deichman project, and Aladdin Petroleum Corp. Baird-Drennan project. Gives brief history, methods employed, and results obtained in barrels of oil produced as a result of the waterflooding. Work done in cooperation with Kansas State Board of Health.
- IC 7832. Active List of Permissible Explosives and Blasting Devices Approved Before December 31, 1957, by N. E. Hanna and G. H. Damon. 1958. 10 pp. Gives all permissible explosives (gelatinous and nongelatinous) and permissible blasting devices on the active list as of December 31, 1957.
- †IC 7833. Administration of the Federal Coal-Mine Safety Act, Calendar Year 1957, by James Westfield, H. F. Weaver, and C. M. Keenan. 1958. 60 pp. Cover fifth year of operations under Federal Coal-Mine Safety Act and reviews activities of Bureau's Division of Coal-Mine Inspection. (See also IC 7685.)
- IC 7834. Engineering Control of Health and Safety Hazards in Uranium Mines, by James Westfield, R. H. Flinn, A. D. Look, and G. G. Morgis. 1958. 20 pp., 1 fig. Discusses health and safety hazards in uranium mining and presents measures for controlling them.
- IC 7835. Shaft-Sinking Methods and Costs at the T. L. Shaft, Eureka Corp., Ltd., Eureka, Nev., by A. C. Johnson. 1958. 25 pp., 16 figs. Describes methods and equipment used and costs incurred in sinking the T. L. shaft to explore and develop lead-zinc-silver ore that had been indicated by drilling. Shaft was sunk 1,127 feet in 630 workdays.
- IC 7836. Sulfur Dioxide—Its Chemistry and Removal From Industrial Waste Gases, by D. Bienstock, L. W. Brunn, E. M. Murphy, and H. E. Benson. 1958. 96 pp., 14 figs. Discusses properties of sulfur dioxide and ways to remove this substance from industrial waste gases to help curb air pollution.
- IC 7837. Open-Pit Mining Methods and Practices at the Chino Mines Division, Kennecott Copper Corp., Grant County, N. Mex., by W. R. Hardwick. 1958. 64 pp., 47 figs. Describes operations at the Chino mine, oldest of the large copper mines in Western United States. In 1804 the Chino mine first produced copper ore, and in 1910 it became an open-pit operation. Current output is 22,500 tons of ore a day.
- IC 7838. Block Caving in Limestone at the Crestmore Mine, Riverside Cement Co., Riverside, Calif., by Albert E. Long and Leonard Obert. 1958. 21 pp., 14 figs. Describes block-caving methods employed at the Crestmore mine for almost a quarter of a century in producing 7,882,000 tons of limestone.
- IC 7839. Determination of Low Concentrations of Methane in Coal-Mine-Air Samples by Infrared Absorption Spectrometry, by P. J. Colbassani and H. A. Watson. 1958. 13 pp., 7 figs. Describes equipment and procedures used by the Bureau for determining low concentrations of methane in coal-mine atmosphere by infrared absorption spectrometry.
- IC 7840. Permissible Mine Equipment Approved During the Calendar Years 1955-56, With Appended Lists of Manufacturers of Flame-Resistant Trailing Cables and Fire-Resistant Conveyor Belts, by E. J. Gleim. 1958. 12 pp. Supplements B 543 and IC 7722. Lists equipment Bureau approved during 1955 and 1956 as permissible for use in underground mines. 15 cents.
- IC 7841. Injury Experience in the Coking Industry, 1955: Analysis of Safety Factors and Related Employment Data, by John C. Machisak and Naomi W. Kearney. 1958. 20 pp. Presents statistical data on fatal and nonfatal injuries at beehive and by-product coke ovens by States and by causes for the year and facts on injuries and employment at all coke ovens from 1916 through 1955. 15 cents.
- IC 7842. Injury Experience in the Quarrying Industry, 1954: Analysis of Safety Factors and Related Employment Data, by John C. Machisak and Naomi W. Kearney. 1958. 48 pp. Presents statistical data on fatal and nonfatal injuries by States and agency and on related employment by States at all quarries. 30 cents.
- IC 7843. Manganese Deposits of Western Arizona, by L. L. Farnham and L. A. Stewart. 1958. 87 pp., 25 figs. Describes most of the known manganese deposits of western Arizona—7 deposits in Coconino, 23 in Maricopa, 32 in Mohave, 11 in Yavapai, and 42 in Yuma Counties. 45 cents.
- IC 7844. Southeastern Alaska's Mineral Industry, by Alvin Kaufman. 1958. 37 pp., 4 figs. Presents information about the minerals of Southeastern Alaska and the factors that affect development of a mining industry in that area.
- IC 7845. Recommended Safety Standards for Surface Auger Mining. 1958. 11 pp. Presents recommended safety standards for auger mining of coal from the surface, outlining precautionary measures for tipples and cleaning plants, fire prevention, augering operations, haulage, electric power, mechanical equip-

†Out of print.

- ment, illumination, abandoned workings, and protective clothing.
- IC 7846. Chemical Solidification of Soil in Tunneling at a Minnesota Iron-Ore Mine, by R. O. Pynnonen and Allen D. Look. 1958. 8 pp., 4 figs. Describes the use of chemicals to solidify a layer of water-saturated, fine gray sand encountered during a tunneling operation at the Tioga No. 2 iron-ore mine.
- IC 7847. Bibliography of Investment and Operating Costs for Chemical and Petroleum Plants, July 1954-December 1956, by Sidney Katell. 1958. 100 pp. (Supplements IC 7516, 7705, and 7751.) To aid plant managers estimating investment and operating costs of petroleum refining and chemical processes, bibliography contains more than 500 abstracts of publications. Indexed by subjects and authors. (See also IC 7884.)
- IC 7848. Methods and Operations at the Yerington Copper Mine and Plant of the Anaconda Co., Weed Heights, Nev., by M. Clair Smith. 1958. 37 pp., 15 figs. Describes operations at the Yerington mine, which comprised mining a large oxidized copper deposit, leaching the ore with sulfuric acid and recovering the metal by precipitation as cement copper.
- IC 7849. Mining Inclined Beds of Phosphate Rock, San Francisco Chemical Co. Mines, Rich County, Utah, by Frank L. Wideman. 1958. 27 pp., 15 figs. Describes methods used in mining inclined beds of phosphate rock in the Arickeree, Pawnee, Mandan, Tuscarora, and Emma mines.
- IC 7850. National First-Aid and Mine Rescue Contest, Louisville, Ky., October 2-4, 1957, by H. F. Weaver and D. M. Alden. 1958. 68 pp., 4 figs. Describes the National First-Aid and Mine Rescue Contest, the fourth after a lapse of 21 years, held in the Kentucky Fair and Exposition Center, Louisville, Ky., under auspices of Bureau and Joseph A. Holmes Safety Association. Eight teams from 3 States participated in the mine rescue contest, and 49 teams from 7 States in the first-aid contest. Two of the teams entered as combination teams, participating in both mine rescue and first-aid contests.
- IC 7851. Bibliography of Model and Pilot-Plant Applications in Ferrous Metallurgy, 1945-56, by W. O. Philbrook. 1958. 14 pp. Includes more than 100 references to scientific papers on use of models and pilot plants for research in ferrous metallurgy. The references cited are chiefly papers indexed from 1945 to 1956 by 1 American and 1 British metallurgical abstracting journal. Work done in cooperation with Carnegie Institute of Technology.
- IC 7852. Fire-Protection System, Allen Coal Mine, Colorado Fuel and Iron Corporation, Stonewall (P. O. Weston), Las Animas County, Colo., by P. C. van Natter. 1958. 23 pp., 15 figs. Describes fire-protection system at Allen coal mine to assist those in the coal-mining industry who are responsible for preventing loss of life in underground operations and for providing fire-fighting facilities at their operations.
- IC 7853. Coal-Mine Ventilation Without Doors to Control Main Air Currents, by D. S. Kingery and E. J. Harris. 1958. 13 pp., 7 figs. Ventilating systems for controlling main air currents in coal mines without using doors are best from standpoint of efficiency, safety, and economy, according to this report. Discusses ventilating plans of bituminous-coal mines in Pennsylvania and West Virginia.
- IC 7854. Exploration, Development, and Costs of the Stormy Day Tungsten Mine, Pershing County, Nev., by A. C. Johnson. 1958. 9 pp., 3 figs. Describes exploration, development, and exploitation methods, and summarizes costs at the Stormy Day tungsten mine, which was discovered in 1941.
- IC 7855. The Mineral Industry of Turkey, by L. Nahai. 1958. 140 pp., 29 figs. Discusses Turkey's mineral economy, political and legal factors affecting mineral development; briefly reviews the country's geography, population, and form of government.
- IC 7856. Bibliography on Gas Chromatography, by Charles Zahn and Stanley H. Langer. 1958. 40 pp. Includes more than 500 references to reports and talks relating to theory and use of gas chromatography in the laboratory and the plant.
- IC 7857. Methods and Practices for Producing Crushed Granite, Campbell Limestone Co., Pickens County, S.C., by Robert Alfred and H. J. Schroeder. 1958. 24 pp., 9 figs. Describes methods employed by the Campbell Limestone Co. in producing a million tons of crushed granite annually from the Liberty quarry.
- IC 7858. Using Precast Reinforced-Concrete Sets in the Pioneer Tunnel of Great Northern Railway's Cascade Tunnel, King County, Wash., by E. W. Parsons. 1958. 10 pp., 10 figs. Describes the successful replacement of wooden timbers with concrete supports in Pioneer Tunnel of Great Northern Railway in the Cascade Mountains.
- IC 7859. Injury Experience in Coal Mining, 1953-54. Analysis of Mine Safety Factors, Related Employment, and Production Data, by John C. Machisak, Virginia E. Wrenn, Nina L. Jones, and Elizabeth J. Reid. 1958. 105 pp., 2 figs. Presents data on fatal and nonfatal injuries in bituminous-coal and Pennsylvania anthracite mines for 1953 and 1954 and by States for the 2 years. Includes historical data on coal-mine fatality rates for the United States for 1870-1954 and injury experience, employment, and production data for 1953 and 1954. 50 cents.
- IC 7860. A Reconnaissance of Asbestos Deposits in the Serpentine Belt of Northern California, by F. J. Wiebelt and M. Clair Smith. 1959. 52 pp., 21 figs. Describes asbestos deposits in 15 counties in northern California. 40 cents.
- IC 7861. Coke Plants in the United States as of December 31, 1957, by Joseph A. DeCarlo and Maxine M. Otero. 1958. 17 pp. For the first time Bureau has combined in one report tabulations on beehive and slot-type ovens. Includes data on number and capacity of all such coke ovens on December 31, 1957. 20 cents.
- IC 7862. Injury Experience in the Coking Industry, 1956. Analysis of Safety Factors and Related Employment Data, by John C. Machisak and Nell B. Bradley. 1958. 15 pp. Presents statistical data on fatal and nonfatal injuries at beehive and slot-type coke ovens by States and by causes for the year and facts on injuries and employment at all coke ovens from 1916 through 1956. 20 cents.
- IC 7863. Stone Cutting and Polishing, by Oliver Bowles. 1958. 26 pp., 12 figs. Describes methods of cutting and polishing stones for architectural, memorial, and jewelry. 25 cents.
- IC 7864. Peat Producers in the United States That Report Production in 1957, by Eugene T. Sheridan and Maxine M. Otero. 1958. 8 pp. Twenty-fourth annual survey of the peat industry by Bureau reveals that 76 producers in 20 States reported commercial production of peat in 1957. 15 cents.
- IC 7865. Fuel-Briquetting and Packaged-Fuel Plants in the United States That Reported Production in 1957, by Eugene T. Sheridan and Maxine M. Otero. 1958. 6 pp. Surveys of the fuel-briquet and packaged-fuel industries show that 17 fuel-briquet plants were in 9 States and 23 packaged-fuel plants in 7 States in 1957. 10 cents.
- IC 7866. Natural-Gasoline and Cycling Plants in the United States, January 1, 1958, by I. F. Avery and L. V. Harvey. 1959. 12 pp. Production capacity of natural-gasoline and cycling plants as of January 1, 1958, was 48.8 million gallons a day, an increase

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of 2.4 million gallons a day since the last biennial survey January 1, 1956. Gives results of survey, including types of plants and daily capacities. 15 cents.

- IC 7867. Petroleum Refineries, Including Cracking Plants, in the United States, January 1, 1958, by C. E. Hennig. 1959. 11 pp. Summarizes refinery capacity by years from 1930 to 1958 and by districts and States on January 1, 1958, and cracking plant capacity by years from 1930 to 1958, by types from 1930 to 1958, and by districts and States on January 1, 1958; also lists changes in crude-oil capacity by districts during 1957. 15 cents.
- IC 7868. Raising With a Suspended Work Cage at the Irene Shaft, Leadville, Colo., by R. L. Bolmer and B. E. Greenlee. 1958. 27 pp., 14 figs. Describes a cage method of driving a 622-foot vertical raise at the Irene shaft in the Leadville mining district. This raise would connect the 1600 level of the Irene shaft with the 1000 level of the nearby Eclipse shaft to provide ventilation for working a lead-zinc-copper-silver ore body opened from the Irene shaft.
- IC 7869. Causes of Roof-Fall Fatalities in Anthracite and Bituminous-Coal Mines, 1955 and 1956, by R. D. Joseph. 1958. 26 pp. Accidents in and around coal mines during 1955 and 1956 resulted in 862 men losing their lives; of these, 454 were due to falls of roof, rib, or face. Includes an analysis of individual accident reports and presents measures that will raise the standards of accident prevention in anthracite and bituminous-coal mines. Work done in cooperation with Roof-Control Committee of the National Safety Council.
- IC 7870. Mining Methods and Costs at the Holden Mine, Chelan Division, Howe Sound Co., Chelan County, Wash., by John R. McWilliams. 1958. 44 pp., 29 figs. Describes mining methods and practices employed at the Holden mine to develop a low-grade ore deposit from which copper, zinc, silver, and gold were obtained.
- IC 7871. Lode-Tin Mining at Lost River, Seward Peninsula, Alaska, by S. H. Lorain, R. R. Wells, Miro Mihelich, J. J. Mulligan, R. L. Thorne, and J. A. Herdlick. 1958. 76 pp., 20 figs. Presents results of special studies by Bureau of mining and milling methods and costs at the Lost River mine during its operating period; includes recommendations for improving possible future mining and milling operations at Lost River.
- IC 7872. Mine Production of Gold, Silver, Copper, Lead, and Zinc in Pend Oreille and Stevens Counties, Wash., 1902-56, Annual Totals by Mines, Districts, and Counties, by Frank B. Fulkerson and Gary A. Kingston. 1958. 51 pp., 1 fig. Gives production of gold, silver, copper, lead, and zinc in Pend Oreille and Stevens Counties for 1902-56 by counties, mining districts, and individual mines.
- IC 7873. Results of Waterflooding in Kansas Oil Sands, Containing Viscous Crude Oils, by J. P. Powell. 1959. 45 pp., 13 figs. Describes six Kansas waterflooding projects in which the oil sands contained viscous crude oils. The projects described are in Allen, Bourbon, Labette, Linn, and Woodson Counties. Work done in cooperation with Kansas State Board of Health.
- IC 7874. Methods and Practices for Producing Crushed Granite, Weston-Brooker Co., Warren County, Ga., by Norman A. Pace and Harold J. Schroeder. 1959. 25 pp., 14 figs. Describes methods and equipment used by the Weston-Brooker Co. in producing more than a million tons of crushed granite annually from the Camak quarry.
- IC 7875. Mining and Milling Methods and Costs at the Indian Creek Mine, St. Joseph Lead Co., Washington County, Mo., by Carl E. Christiansen, Willis A. Calhoun, and Walter F. Brown. 1959. 47 pp., 17 figs. Describes methods and costs of mining and milling lead ore at the Indian Creek mine.
- IC 7876. Some Aspects of the Coal Industry of U.S.S.R., by George Markon and George D. Drechsler. 1959. 31 pp., 1 fig. Describes rapid growth and development of the Soviet coal industry.
- IC 7877. Zinc-Ore Mining and Milling Methods, Piquette Mining and Milling Co., Tennyson, Wis., by W. A. Grosh and T. A. Evans, Jr. 1959. 16 pp., 5 figs. Describes mining and milling methods at a small iron-ore mine, the Piquette No. 2 mine in Wisconsin.
- IC 7878. Tin-Placer Sampling Methods and Results, Cape Mountain District, Seward Peninsula, Alaska, by John J. Mulligan and Robert L. Thorne. 1959. 69 pp., 38 figs. Presents sampling results of four tin-placer deposits in the Cape Mountain district—Cape Creek, First Chance Creek, Cape Creek Beach, and Boulder Creek; includes sampling procedure and description of the deposits.
- IC 7879. Sinking Methods and Costs at the Burgin Shaft, Bear Creek Mining Co., East Tintic Project, Utah County, Utah, by F. D. Everett. 1959. 26 pp., 17 figs. Describes sinking methods employed in sinking the three-compartment Burgin shaft to search for lead, zinc, copper, silver, and gold. The operation featured a positive action, clam-type shaft mucker, which was designed and first used in Canada.
- IC 7880. Asbestos. A Materials Survey, by Oliver Bowles. 1959. 94 pp., 8 figs. Asbestos furnishes a major raw material for a great variety of essential products, according to this publication reviewing types and grades, sources, reserves, and uses of this mineral commodity. This revised survey, originally published in 1952, was prepared for the Office of the Civil and Defense Mobilization. \$1.25.
- †IC 7881. Cadmium. A Materials Survey, by Robert L. Mentch and Arnold M. Lansche. 1958. 43 pp., 4 figs. Cadmium has become important for many specialized uses, according to this publication reviewing sources, supply, technology, and uses of the metal. This survey was prepared for the Office of Civil Defense Mobilization.
- IC 7882. Selected Bibliography on Low-Temperature Tar, by H. H. Lowry and H. C. Anderson. 1959. 52 pp. Reviews literature on low-temperature tar from 1942 through 1957. Lists more than 150 abstracts of reports. 35 cents.
- IC 7883. Bibliography on Extractive Metallurgy of Nickel and Cobalt, 1900-1928, by Curtis A. Jones. 1959. 33 pp. Supplements IC 7805. Reviews the chemical literature on nickel and cobalt from 1900 to 1928, including several references before 1900 and several after 1928 that were not included in the earlier circular. Lists nearly 350 abstracts of reports. 30 cents.
- IC 7884. Bibliography of Investment and Operating Costs for Chemical and Petroleum Plants, January-December 1957, by Sidney Katell, John H. Faber, and Bryce L. Maddox. 1959. 57 pp. Supplements IC 7516, 7705, 7751, and 7847. Material gathered by Bureau in synthetic fuels study. It will aid plant managers estimating investment and operating costs of petroleum refining and chemical processes. Bibliography contains nearly 300 abstracts of articles and publications. Indexed by subjects and authors. 40 cents.
- IC 7885. Respiratory Protective Devices Approved by the Bureau of Mines as of October 16, 1958, by E. J. Kloos and S. J. Pearce. 1959. 25 pp. Lists all such respiratory protective devices. 15 cents.

†Out of print.



- IC 7886. Bibliography of Processes for Removing Hydrogen Sulfide From Industrial Gases, January 1950–December 1957, by Sidney Katell and Liang-Tseng Fan. 1959. 43 pp. Contains more than 200 abstracts dealing with the removal of hydrogen sulfide from a gas stream. 30 cents.
- IC 7887. Mining and Transporting Coal Underground by Hydraulic Methods: A Literature Survey, by William T. Boyd. 1959. 33 pp., 10 figs. Discusses progress by Russia, New Zealand, and other countries in mining and transporting coal by hydraulic methods. 30 cents.
- IC 7888. Mining Methods and Costs at the Anaconda Company Berkeley Pit, Butte, Mont., by John R. McWilliams. 1959. 46 pp., 26 figs. Describes methods used in designing and developing the Berkeley open-pit copper mine.
- IC 7889. Airflow Changes in Multiple-Fan Systems, by D. S. Kingery and F. F. Kapsch. 1959. 24 pp., 16 figs. Describes studies by Bureau of multiple-fan ventilating systems of three large coal mines; discusses hazards that may occur when a fan stops and presents measures to control them.
- IC 7890. Block-Caving Mining Methods and Costs, Bagdad Mine, Bagdad Copper Corp., Yavapai County, Ariz., by W. R. Hardwick. 1959. 28 pp., 16 figs. Describes block-caving methods used from 1936 to 1948 at the Bagdad copper mine, which produced over 4 million tons of ore by this underground operation.
- IC 7891. Methods and Costs of Mining Lignite in North Dakota, by J. N. Van Sant and R. O. Ellman. 1959. 82 pp., 32 figs. Describes mining and preparation methods at six lignite mines—Nooan, Beulah, Custer, Dakota Star, Kincaid, and Velva—in North Dakota.
- IC 7892. Analysis of 494 Accidents, Open-Pit Iron-Ore Mines, Beneficiation Plants, and Shops, Lake Superior District, by R. O. Pynnonen, L. J. Zaverl, and A. D. Look. 1959. 13 pp., 4 figs. Gives results of a study of 494 accidents in open-pit iron-ore mines, beneficiation plants, and shops for a 7-year period. These accidents caused 499 lost-time injuries, including 12 fatalities.
- IC 7893. Review and Status of Low Temperature Tar Investigations of the Bureau of Mines, by Bureau of Mines staff. 1959. 32 pp., 11 figs. Reviews Bureau's studies of tars obtained by carbonizing coal at low temperatures; describes research being done at Bureau's experiment stations at Pittsburgh and Bruceton, Pa.; Denver, Colo.; Grand Forks, N. Dak.; and Morgantown, W. Va.
- IC 7894. Abating Stream Pollution by Recovering Waste Oil From Steel Rolling Mills, by B. P. Martinez. 1959. 21 pp., 11 figs. Presents results of a research and development program in recovering waste-rolling-mill oils conducted by Bethlehem Steel Co. at its Sparrows Point plant in Maryland.
- IC 7895. Special Precautions for Multiple Short-Delay Blasting in Coal Mines, by John Nagy, Irving Hartmann, and Robert W. Van Dolah. 1959. 8 pp., 4 figs. Special precautions for multiple short-delay blasting of coal in underground mines are presented in this circular to guide safety engineers, shot frers, and coal-mine inspectors. These new safety recommendations are suggested in addition to those normally followed in blasting, as outlined in the Federal Mine Safety Codes for bituminous-coal, lignite, and anthracite mines.
- IC 7896. Four Waterflooding Projects in Washington and Nowata Counties, Okla., 1959, by J. P. Powell. 1959. 34 pp., 12 figs. Discusses 3 waterflooding projects in Washington County—Van Dall Bros. Post Oak project, The Texas Natural & Layton Oil Co. Dewey flood project, and Wellsville Oil Co. & Oil Recovery Corp. K. & S. project—and 1 project in Nowata County—American Climax Petroleum Corp. Childers unit project. Gives brief history, methods employed, and results obtained from the waterflooding. Work done in cooperation with State of Oklahoma.
- IC 7897. Mining and Processing Silica Sands at Overton, Nev., by Simplot Silica Products, Inc., by M. Clair Smith. 1959. 12 pp., 5 figs. Describes methods used in mining and processing silica sands by Simplot Silica Products, Inc. 15 cents.
- IC 7898. Sulfur in California and Nevada, by George C. Branner. 1959. 50 pp., 6 figs. Includes production, history of production, shipments, values, consumption, deposits, and occurrences of sulfur in California and Nevada. 35 cents.
- IC 7899. Injury Experience in the Coking Industry, 1957. Analysis of Safety Factors and Related Employment Data, by John C. Machisak, Nell B. Bradley, and Nina L. Jones. 1959. 16 pp. Presents statistical data on fatal and nonfatal injuries at beehive and slot-type coke ovens by States and by causes for the year and facts on injuries and employment at all coke ovens from 1916 through 1957. 20 cents.
- IC 7900. Historical Summary of Coal-Mine Explosions in the United States, by H. B. Humphrey. 1959. 275 pp., 186 figs. The most comprehensive publication of its type ever prepared, circular describes major explosions covering more than a century, reviews growth of explosion hazards with the increased number and size of coal mines and the changing mining methods, and discusses causes of explosions during each period of years to show progress or its lack in controlling or eliminating different causes. \$1.50.
- IC 7901. Determining the Explosibility of Mine Atmospheres, by M. G. Zabetakis, R. W. Stahl, and H. A. Watson. 1959. 11 pp., 5 figs. Presents a new method employing a series of diagrams that can be used to determine whether a mine area sealed to extinguish a coal-mine fire can be reopened safely.
- IC 7902. Administration of the Federal Coal-Mine Safety Act, 1952–58, by James Westfield, H. F. Weaver, and C. M. Keenan. 1959. 68 pp. Covers sixth year of operations under Federal Coal-Mine Safety Act and reviews activities of the Bureau's Division of Coal-Mine Inspection. (See also IC 7685.)
- IC 7903. Mining Methods and Costs, Baguio Gold Mine, Baguio Gold Mining Co., Baguio, Luzon, Philippine Islands, by A. A. Bakewell, Jr. 1959. 47 pp., 28 figs. First in the Bureau's series on mining methods, practices, and costs to cover a foreign mining activity, publication describes methods and costs of mining gold at the Baguio mine in the Philippine Islands. Author, general manager of mine, volunteered his services in making information available through Bureau.
- IC 7904. Research and Technologic Work on Coal and Related Investigations, 1956, by Bureau of Mines Staff. 1959. 112 pp., 21 figs. Twenty-first in a series, report summarizes Bureau research and technologic work on coal. Covers origin and properties of coal; investigations in mining, storage, preparation, and utilization of anthracite, bituminous coal, and lignite; and health and safety programs for coal miners.
- IC 7905. Research and Technologic Work on Coal and Related Investigations, 1957, by Bureau of Mines Staff. 1959. 85 pp., 20 figs. Twenty-second in a series, report summarizes all research by the Bureau on coal, which was directed toward promoting conservation of coal resources through improved production and utilization during the year.

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- IC 7906. Investigation of Oxygen Production by Metal Chelates, by R. F. Stewart, P. A. Estep, and J. J. S. Sebastian. 1959. 38 pp., 8 figs. Chelated metals of the salcomine type appear to be that most promising chemical sorbents of oxygen from air, according to this report describing investigations in producing oxygen (used in coal gasification) by metal chelates.
- IC 7907. Mining Methods and Costs, Lincoln Tungsten Mine, Wah Chang Mining Corp., Lincoln County, Nev., by A. C. Johnson and Ross M. McDonald. 1959. 18 pp., 8 figs. Describes methods of mining tungsten at the Lincoln mine; includes summary of costs. 35 cents.
- IC 7908. Underground Mining Methods and Costs at Three Salt Wash Uranium Mines of Climax Uranium Co., by W. L. Dare. 1959. 36 pp., 22 figs. Describes underground mining methods and costs at three uranium mines—the G-1, Mineral Joe, and Frank No. 1—on the Colorado Plateau. 30 cents.
- IC 7909. Mining Methods and Costs, Iowa Gypsum Deposits, by L. G. Marshall. 1959. 23 pp., 9 figs. Describes methods employed by the U.S. Gypsum Co., Bestwall Gypsum Co., and National Gypsum Co. in mining gypsum deposits in the Fort Dodge area, Iowa.
- IC 7910. Bibliography on Semiconductors for Thermoelectric Use, by E. H. Illsley and H. Kato. 1959. 28 pp. Contains nearly 150 abstracts of articles and publications appearing between 1950 and the summer of 1958, including a few earlier ones. 25 cents.
- IC 7911. Open-Pit Copper Mining Methods, Morenci Branch, Phelps Dodge Corp., Greenlee County, Ariz., by W. R. Hardwick. 1959. 67 pp., 59 figs. Describes mining methods and practices at the Morenci open-pit copper mine. 45 cents.
- IC 7912. Milling and Processing Tungsten, by J. B. Zadra. 1959. 120 pp., 29 figs. Summarizes milling practices and chemical treatment methods used at a number of tungsten operations; discusses production and uses of tungsten metal and analytical methods. 60 cents.
- IC 7913. Coyote-Hole Primary Blasting, Dresser Trap Rock Co., Dresser, Wis., by L. G. Marshall. 1959. 18 pp., 18 figs. Describes mining altered basalt by the Dresser Trap Rock Co. 20 cents.
- IC 7914. Sinking No. 3 Shaft at Westvaco Trona Mine, Intermountain Chemical Co., Sweetwater County, Wyo., by F. L. Widemann, C. A. Romano, and T. Berry. 1959. 31 pp., 23 figs. Describes sinking the 1,584-foot shaft at the Westvaco trona mine, which was accomplished in 9½ months by using special equipment and more than 1 shift daily. Includes description of mining methods used at Westvaco. 25 cents.
- IC 7915. Injury Experience in the Metal and Non-metal Industries, 1955, by John C. Machisak, Naomi W. Kearney, Elizabeth B. Dixon, and Hazel M. Keener. 1959. 48 pp. Presents data on fatal and nonfatal injuries and employment in the metal and nonmetal mines, by States (including Alaska), for the year, and historical data on employment and injury experience for the United States (including Alaska) during 1911-55. 30 cents.
- IC 7916. Bibliography of Investment and Operating Costs for Chemical and Petroleum Plants, January-December 1958, by Sidney Katell, John H. Faber, and John W. Douglas. 1959. 55 pp. To aid plant managers estimating investment and operating cost of petroleum refining and chemical processes, bibliography contains more than 200 abstracts of publications. Indexed by subjects and authors. 40 cents.
- IC 7917. Mining and Milling Methods, Inland Lime and Stone Co., Port Inland, Mich., by L. G. Marshall. 1959. 22 pp., 20 figs. Describes operation of a limestone quarry producing flux for the steel industry and crushed stone for production of concrete. 25 cents.
- IC 7918. Reconnaissance of Iron Occurrences in Colorado, by C. M. Harrer and W. J. Tesch, Jr. 1959. 82 pp., 22 figs. Describes history, location, general features, and treatment of iron occurrences in Colorado. 70 cents.
- IC 7919. Electric-Power-Distribution System, Potash Mine and Refinery, Duval Sulphur & Potash Company, Carlsbad, N. Mex., by J. Howard Bird and A. Z. Dimitroff. 1959. 27 pp., 19 figs. Describes the power-distribution system of the potash mine and refinery of the Duval Sulphur & Potash Company.
- IC 7920. An Indirect-Cycle Nuclear-Reactor System to Furnish Process Heat—Engineering and Design Concepts, by R. Carson Dalzell and James P. McGee. 1959. 16 pp., 6 figs. Discusses nuclear process heat for chemical reactions, factors influencing design of a process heat reactor, reactor-system components, and use of nuclear process heat for coal gasification.
- IC 7921. Bibliography of Reports Containing Analyses of Crude Oils by the Bureau of Mines Routine Method, by O. C. Blade. 1959. 181 pp. Contains more than 150 abstracts of publications that contain complete analyses of samples of crude petroleum by the Bureau of Mines. Lists references to crude-oil analyses from 28 States, including Alaska, as well as a number of foreign countries in both hemispheres. Report brings up to date the information in IC 7470 and in the appendix of B 490. Work done in cooperation with State of Oklahoma. \$1.00.
- IC 7922. Uranium-Mining Practices and Costs at Ten Salt Wash Lease Operations of Union Carbide Nuclear Co., by W. L. Dare. 1959. 71 pp., 34 figs. One of a series on methods and costs of mining uranium ore on the Colorado Plateau, report describes small-scale operations of the Salt Wash miner. 60 cents.
- IC 7924. Peat Producers in the United States That Reported Production in 1958, by Eugene T. Sheridan and Virginia C. Berté. 1959. 7 pp. Twenty-fifth annual survey of the peat industry by the Bureau reveals that 79 producers in 21 States reported commercial production of peat in 1958. 15 cents.
- IC 7925. Coal-Chemical Materials Produced at Coke Plants in the United States, 1948-57, by Joseph A. DeCarlo and Maxine M. Otero. 1959. 20 pp., 4 figs. Presents economic review and statistical summary of coal-chemical materials recovered from coke-oven operations in the United States from 1948 through 1957. (See also IC 7504.) 20 cents.
- IC 7926. Placer Mining in Alaska: Methods and Costs at Operations Using Hydraulic and Mechanical Excavation Equipment With Nonfloating Washing Plants, by Bruce S. Thomas, Donald J. Cook, Ernest Wolff, and William H. Kerns. 1959. 84 pp., 33 figs. One of a series on placer mining in Alaska, circular describes mining methods that were developed during the last 80 years to cope with conditions peculiar to arctic and subarctic regions and are now used by a large segment of the placer mining industry in Alaska. (See also B 259.) 80 cents.
- IC 7927. Injury Experience in the Quarrying Industry, 1955 and 1956, by John C. Machisak, Naomi W. Kearney, and Zaida S. Glidden. 1959. 77 pp. Presents statistical data on fatal and nonfatal injuries and related employment at all quarries by States. 45 cents.
- IC 7929. Open-Pit Copper Mining Methods and Costs at the Bagdad Mine, Bagdad Copper Corp., Yavapai

- County, Ariz., by W. R. Hardwick and E. L. Jones III. 1959. 30 pp., 13 figs. Describes mining methods and practices at the Bagdad open-pit copper mine. 35 cents.
- IC 7930. Mining Methods and Costs at the Piokee Mining Unit and the Piokee Experimental Mining Project, The Eagle-Picher Co. (Tri-State Mines), Ottawa County, Okla., by J. B. Elizondo. 1959. 26 pp., 13 figs. Describes mining methods and practices at the Piokee zinc-lead mining unit and experimental mining project; includes mining costs. 25 cents.
- IC 7931. Firefighting Facilities at Coal Mines Compared With Those at Other Industrial Plants, by R. W. Stahl. 1959. 12 pp., 3 figs. Compares emphasis placed on fire hazards at some coal mines and industrial plants.
- IC 7932. Control of Fires in Inactive Coal Deposits in Western United States, Including Alaska, 1948-58, by T. R. Jolley and H. W. Russell. 1959. 22 pp., 12 figs. Of the 40 fires extinguished or controlled in inactive coal deposits in the Western United States and Alaska from 1948 to 1958, 35 were controlled by smothering, 3 were controlled by the isolation method, and 2 were extinguished by the removal method, according to this report discussing the fire-control activities in States west of the Mississippi River and Alaska.
- IC 7933. Strontium. A Materials Survey, by Albert E. Schreck and Joseph C. Arundale. 1959. 45 pp., 6 figs. Covers uses, resources, world production, mining, milling, and processing strontium minerals. Survey was prepared for the Office of the Civil and Defense Mobilization. 35 cents.
- IC 7934. Coke Plants in the United States on December 31, 1958, by Joseph A. DeCarlo and Maxine M. Otero. 1959. 20 pp. Includes data on number and capacity of beehive and slot-type ovens on December 1, 1958. 20 cents.
- IC 7935. Fuel-Briquetting and Packaged-Fuel Plants in the United States That Reported Production in 1958, by Eugene T. Sheridan and Virginia C. Berté. 1959. 7 pp. Surveys of the fuel briquet and packaged-fuel industries show that 16 fuel-briquet plants were operating in 8 States and 23 packaged-fuel plants in 7 States in 1958. 10 cents.
- IC 7937. Petroleum Refineries, Including Cracking Plants, in the United States, January 1, 1959, by C. E. Hennig. 1959. 11 pp. Summarizes refinery capacity by years from 1930 to 1959 and by districts and States on January 1, 1959, and cracking plant capacity by years from 1930 to 1959, by types from 1941 to 1959, and by districts and States on January 1, 1959; also lists changes in crude-oil capacity by districts during 1958. 15 cents.
- IC 7940. Petroleum and Natural Gas Research, Bureau of Mines, Fiscal Years 1954, 1955, and 1956, by A. J. Kramer. 1959. 79 pp., 14 figs. Summarizes petroleum work of Bureau; includes studies of petroleum and gas development and production, transportation and storage of natural gas, petroleum chemistry and refining, nitrogen constituents of petroleum, and thermodynamics of petroleum.
- IC 7941. Mercury. A Materials Survey, by James W. Pennington, with a chapter on Resources, by Edgar H. Bailey. 1959. 9 pp., 19 figs. Covers properties, uses, resources, technology, supply and distribution, marketing, and grades and specifications of mercury. Survey was prepared with the cooperation of the Geological Survey for the Office of the Civil and Defense Mobilization. \$1.00.
- IC 7942. Crude-Oil and Refined-Products Pipeline Mileage in the United States, January 1, 1959, by W. G. Messner. 1959. 8 pp. From 1956 through 1958, 14,886 miles of new pipe and 10,649 miles of second-hand pipe were laid, according to this circular summarizing the total mileage change in petroleum pipelines for the 3 years. 10 cents.
- IC 7943. Loss of Life Among Wearers of Oxygen Breathing Apparatus (Revision of I.C. 7279), by Alexander E. Morrow. 1959. 28 pp. Presents information on deaths of eight men who lost their lives while wearing oxygen breathing apparatus that were not included in IC 7279, issued in 1944, and describes one death that occurred since 1944.