

REPORTS OF INVESTIGATIONS¹

- †RI 2003a. TNT as a Blasting Explosive, by Charles E. Munroe and Spencer P. Howell. 1919. 14 pp. Describes characteristics of TNT, gives results of tests under various conditions, and lists precautions necessary in use.
- †RI 2012. The Alsatian Potash Industry, by F. K. Cameron. 1919. 9 pp. Gives location of Alsatian potash deposits, lists mines, describes mining methods, and summarizes future possibilities.
- †RI 2015. The Magnesite Industry in Austria, by W. C. Phalen. 1919. 4 pp. Gives location and characteristics of Austrian magnesite deposits, describes methods of mining and preparation, and summarizes conditions that make profitable production possible.
- †RI 2020. The Potash Industry of the United States and Its Possibilities for Future Production, by A. E. Wells. 1919. 20 pp. Lists all possible sources of potash and summarizes production methods.
- †RI 2026. Talc Mining in Vermont, by R. B. Ladoo. 1919. 15 pp., 1 fig. Lists talc mines by owners and describes mining and milling practice.
- †RI 2054. Explosion Hazard in Steel Mills Arising from Partially Consumed Coal Dust, by L. D. Tracy. 1919. 5 pp. Cites dangers of allowing coal dust to accumulate in furnace rooms and describes tests to determine its explosibility.
- †RI 2058. Destruction of the Coal Mines and Steel Plants of Northern France, by G. S. Rice. 1919. 5 pp. Outlines extent and character of destruction of French collieries and steel and iron plants during World War and gives plans for reconstruction.
- †RI 2059. Standardization and Systematization of Mining Practice, by R. R. Hornor. 1919. 3 pp. Stresses need of standardizing mining practice and lists mines where such a program is under way.
- †RI 2064. Use of Magnesia Cement as a Protection for Mine Timbers, by W. C. Phalen. 1919. 2 pp. Explains method of applying magnesite cement to mine timbers and describes its characteristics.
- †RI 2065. Permeability of Oxygen Breathing Apparatus to Gasoline Vapors, by A. C. Fieldner, S. H. Katz, and S. P. Kinney. 1919. 4 pp. Gives results of experiments on oxygen breathing apparatus.
- †RI 2070. Physical Examination of Hoisting Engineers in Utah, by C. A. Allen and A. L. Murray. 1920. 5 pp. Quotes law and describes its operation.
- †RI 2073. Duties of a Petroleum Production Engineer, by A. W. Ambrose. 1920. 4 pp. Lists duties and qualifications.
- †RI 2074. Cooperative Petroleum Work in Wyoming, by F. B. Tough and B. H. Scott. 1920. 4 pp. Describes remedial work on wells.
- RI 2082. Electric Sparking in Mines from Lightning, by G. S. Rice and L. C. Hsley. 1920. 3 pp. Gives precautions to be observed in avoiding such accidents.
- †RI 2087. Necessity for Helium Conservation, by Andrew Stewart. 1920. 2 pp. Emphasizes value of helium as a balloon gas and lists known sources.
- †RI 2091. Manufacture of Carbon Black from Natural Gas, by Roy O. Neal. 1920. 6 pp. Describes various processes used, but recommends that natural gas be used for a domestic fuel rather than be diverted to carbon-black manufacture.
- †RI 2092. Records of Individual Wells, by A. W. Ambrose. 1920. 2 pp. Voices necessity for complete, accurate records of oil and gas wells.
- †RI 2094. Comparison of British and American Coal-Mining Conditions, by G. S. Rice. 1920. 3 pp. Quotes article in British magazine and refutes many of its statements.
- †RI 2096. Sulfur in Coal and Coke, by Alfred R. Powell. 1920. 2 pp. Gives results of analyses of various coals by Powell and Parr method.
- †RI 2097. Diatomaceous (Infusorial) Earth, by W. C. Phalen. 1920. 7 pp. Defines diatomaceous earth, gives analyses, and describes preparation and uses. Lists deposits of United States.
- †RI 2101. Employee Representation in Mining Enterprises, by T. T. Read. 1920. 3 pp. Outlines and defines four systems of employee representation.
- †RI 2102. Observations with the Geophone, by Alan Leighton. 1920. 5 pp. Describes construction of geophone and conditions for satisfactory operation and names used.
- †RI 2103. Automobile Exhaust Gases in Vehicular Tunnels, by A. C. Fieldner. 1920. 3 pp. Describes tests to determine composition of automobile exhaust gases at Pittsburgh station and notes their importance to drivers.
- †RI 2103a. Weathering Test of Lignite, by John A. Davis and John Gross. 1920. 5 pp. Describes weathering test of Alaska lignite.
- †RI 2103b. Comparative Steaming Tests of Alaska Lignite and Spruce Wood, by J. A. Davis and Paul Hopkins. 1920. 16 pp. Mentions equipment used and describes tests and results.
- †RI 2104. The Engineering Aspects of the Petroleum Industry, by E. W. Wagy. 1920. 6 pp. Emphasizes need for trained men in petroleum industry and states qualifications for production engineer, construction engineer, refinery engineer, natural-gas engineer, and oil-shale engineer.
- †RI 2105. Cooperative Petroleum Work in the Rocky Mountain Fields, by F. B. Tough. 1920. 6 pp. Describes purposes and activities of Rocky Mountain Petroleum Association, an organization of producing companies formed to promote conservation.
- †RI 2106. Oil Thieves, by A. R. Elliott. 1920. 4 pp. Discusses construction and use of devices for sampling oil.
- †RI 2107. Features of the Colombian Petroleum Law, by J. W. Thompson. 1920. 3 pp. Gives résumé of law.
- †RI 2109. Safe Storage of Coal, by H. H. Stock. 1920. 8 pp. Questions and answers on coal storage, grouped by quantity to be stored.
- †RI 2110. Talc and Soapstone, by R. B. Ladoo. 1920. 3 pp. Lists uses of talc in pottery.
- †RI 2111. Casting Losses in Aluminum Practice in the United States, by R. J. Anderson. 1920. 3 pp. Estimates amount of casting losses and mentions defects causing losses.
- †RI 2112. Milling and Flotation, by Thomas Varley. 1920. 3 pp. Defines and describes milling, flotation, and differential flotation.
- †RI 2113. The Field of Work of the United States Bureau of Mines, by V. H. Manning. 1920. 5 pp. Dis-

¹Missing serial numbers represent reports now obsolete, such as monthly reports of fatalities, coke-oven accidents, production of explosives, and petroleum bibliographies, published in annual reports on these subjects. Free publications still in print are obtainable from the Publications Distribution Section, Bureau of Mines, Washington 25, D.C.

†Out of print.

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- cases work of Bureau as defined by its organic act and cites typical problems.
- †RI 2114. Use of Airplanes in Mine Rescue Work, by F. J. Bailey. 1920. 3 pp. Names advantages and disadvantages of airplanes to aid Bureau of Mines rescue service.
- †RI 2115. Educational Agencies in Mining Communities, by T. T. Read. 1920. 4 pp. Classifies educational facilities in typical communities.
- †RI 2116. Influence of Age and Occupation on Frequency and Severity of Disability, by W. W. Adams. 1920. 5 pp., 1 fig. Places workers in 12 age groups and tabulates disability data for each.
- †RI 2117. The Efficiency of Mine Labor, with Special Consideration of Industrial Medicine and Health Conservation, by Arthur L. Murray. 1920. 6 pp. Points out importance of medical examinations before employment of workers, shows what industrial medicine is doing to promote labor efficiency, and notes value of hygienic working and living conditions.
- †RI 2118. Evaporation of Crude Oil in the Mid-Continent Field, by J. H. Wiggins. 1920. 5 pp. Estimates losses in storage on the lease by causes and seasons.
- †RI 2119. Notes on Spontaneous Explosions of Nitroglycerin in Oil and Gas Wells, Stephens, Palo Pinto, and Young Counties, North Texas, by R. E. Collom. 1920. 8 pp. Describes use of nitroglycerin in shooting wells, gives notes on spontaneous explosions, and suggests precautions for avoiding future accidents.
- †RI 2121. The Natural Hydrocarbons; Gilsonite, Elaterite, Wurtzilite, Grahamite, Ozokerite, and Others, by R. B. Ladoo. 1920. 12 pp. Gives sources, characteristics, and uses of these hydrocarbons, and includes brief bibliography.
- †RI 2122. Collection and Examination of Rock Dust in Mine Air, by W. A. Selvig, F. D. Osgood, and A. C. Fieldner. 1920. 7 pp. Outlines method of collecting and examining dust samples.
- †RI 2123. Safe Use of Alternating-Current Type of Coal-Cutting Equipment, by L. C. Ilsley and E. J. Gleim. 1920. 3 pp. Recommends safety measures to be applied when electrical coal-cutting equipment is used.
- †RI 2124. The Relative Safety of Brass, Copper, and Steel Gauzes for Use in Miners' Flame Safety Lamps, by L. C. Ilsley and A. B. Hooker. 1920. 8 pp. Gives tables on relative safety of single and double gauzes and on heating effect, weight, and fabric of gauze.
- †RI 2125. Notes on the Magnesium Industry in the United States, by W. C. Phalen. 1920. 11 pp. Describes uses and properties of magnesium and discusses manufacture.
- †RI 2126. A Fatal Blasting Accident, by Oliver Bowles and J. E. Crawshaw. 1920. 3 pp. Gives account of blasting accident in limestone quarry and states conclusions to be drawn.
- †RI 2127. The Uses of Talc and Soapstone, by R. B. Ladoo. 1920. 9 pp. States uses in outline form.
- †RI 2128. Sulfur Dioxide as a Factor in the Smoke Problem in Salt Lake City, by G. St. J. Perrott. 1920. 6 pp. Gives results of tests of Salt Lake City atmosphere to determine presence of sulfur dioxide from smelters.
- †RI 2129. Dutch Guiana Bauxite Ordinance, by J. W. Thompson. 1920. 4 pp. Gives résumé of law.
- †RI 2130. Oil Shales and Their Economic Importance, by M. J. Gavin. 1920. 3 pp. Discusses importance of this country's oil-shale deposits as a source of petroleum.
- †RI 2131. The Durability of Electric Heaters for Gasoline Distillation, by W. A. Jacobs and E. W. Dean. 1920. 2 pp. Compares heater developed by Bureau of Mines with commercial heater.
- †RI 2133. Metal-Mine Ventilation and Its Relation to Safety and Efficiency in Mining Operations, by D. Harrington. 1920. 8 pp. Outlines conditions in metal mines making adequate ventilation necessary and stresses its value in increasing efficiency. Recommends methods of properly ventilating mines.
- †RI 2134. Stiff Hats for the Protection of Miners Against Falling Rock, by C. L. Colburn. 1920. 1 p. Describes various types of protective headgear for miners.
- †RI 2135. Methods Used in Utah for Signaling Mine Hoists from Moving Cages, by C. A. Allen. 1920. 2 pp. Tells of efficient method in use in Utah shaft.
- †RI 2136. Disposal of Used Explosive Containers, by C. L. Colburn. 1920. 1 p. Emphasizes care necessary in disposing of cases that may contain explosive.
- †RI 2137. Modified TNT as a Blasting Explosive, by C. E. Munroe and S. P. Howell. 1920. 4 pp. Describes tests of mixture of nitrostarch explosive and TNT.
- †RI 2138. The Determination of Free Calcium Oxide in Caustic-Burned Magnesium Oxide, by L. H. Duschak. 1920. 4 pp. Gives results of tests of western magnesite; largely in tabular form.
- †RI 2139. Ocher, Umber, and Sienna, by Harry E. Tuft. 1920. 6 pp. States uses and specifications, describes methods of preparation and location of deposits, and gives prices and trade data.
- †RI 2140. Mica, by Oliver Bowles. 1920. 22 pp. Gives general information on location of mica deposits.
- †RI 2141. Investigation of the Fundamentals of Oil-Shale Retorting, by M. J. Gavin and L. H. Sharp. 1920. 4 pp. Describes distillation of oil from De-Beque (Colo.) shales and outlines fundamentals of detailed retorting tests.
- †RI 2142. Talc and Soapstone, by R. B. Ladoo. 1920. 5 pp. Discusses properties of talc and soapstone and stresses necessity for more thorough determination to indicate additional uses.
- †RI 2143. Coal in the British Isles, by G. S. Rice. 1920. 3 pp. Outlines briefly mining methods and costs and gives table of estimated reserves.
- †RI 2144. Precautions in the Use of Oxygen Breathing Apparatus, by G. S. Rice. 1920. 2 pp. Issues warning against attempting too extensive explorations in noxious atmospheres with breathing apparatus.
- †RI 2145. Miner's Yearly and Daily Output of Coal, by W. W. Adams. 1920. 8 pp. Summarizes production rates of miners in United States, New South Wales, Nova Scotia, British Columbia, Great Britain, Prussia, France, Austria, Belgium, Japan, and India.
- †RI 2147. Dangers from Explosives Fumes in Metal Mining, by D. Harrington and E. W. Dyer. 1920. 3 pp. Describes accidents in metal mines, indicating danger to metal-mine workers from inhaling fumes.
- †RI 2148. A Mathematical Method of Constructing Average Oil-Well Production Curves, by W. W. Cutler, Jr. 1920. 7 pp., 1 fig. Explains method in detail and gives specimen curves.
- †RI 2150. Talc in Fire-Resistant Paint, by R. B. Ladoo. 1920. 3 pp. Describes use in paint of asbestos, a fire-resistant magnesium silicate.
- †RI 2151. Cooperative Store, Ajo, Ariz., by E. D. Gardner. 1920. 2 pp. Discusses management of cooperative store in isolated mining town.
- †RI 2152. Some Physical and Chemical Data on Colorado Oil Shale, by M. J. Gavin and L. H. Sharp. 1920. 8 pp. Includes account of tests of Colorado shales and tables on specific heats of various materials, heats of combustion, and heat conductivity, with analyses of shales from Colorado, Nevada, Utah, Wyoming, Kentucky, and California.
- †RI 2153. Stench Warnings in Metal Mines, by A. C. Fieldner and S. H. Katz. 1920. 3 pp. Describes use of ethyl mercaptan and amyl acetate to give warning of metal-mine disasters.
- †RI 2154. Blasting Granite with Compressed Air, by Oliver Bowles. 1920. 3 pp. Describes use of compressed air in Georgia granite quarry.

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- †RI 2156. Misfires in Metal Mining, by S. P. Howell and C. L. Colburn. 1920. 3 pp. Describes procedure when misfires occur and suggests preventive measures.
- †RI 2157. Factors in Determining Gasoline Content in Natural Gas by the Absorption Method, by D. B. Dow. 1920. 5 pp., 4 figs. Discusses application of method and gives tabular data on distillation losses.
- †RI 2158. Recovery of Gold from a Magnetic Black Sand, by John A. Davis and John Gross. 1920. 5 pp. Describes tests of black sand from Fairbanks Creek, Alaska.
- †RI 2159. Bureau of Mines Methods for Determining Water in Petroleum, by E. W. Dean and W. A. Jacobs. 1920. 3 pp. Lists and describes equipment used.
- †RI 2160. Recovery of Gold from Black Sand by Classified Concentration, by John A. Davis and John Gross. 1920. 3 pp. Explains method of treating sand, lists results in tabular form, and gives conclusions.
- †RI 2161. The Menace of Opening Kegs of Black Blasting Powder with Wooden Tools, by S. P. Howell. 1920. 3 pp. Calls attention to dangerous practice in handling black blasting powder.
- †RI 2162. Talc Mining and Milling, Modoc, Ontario, by R. B. Ladoo. 1920. 5 pp., 2 figs. Describes methods and gives flow sheet of mill.
- †RI 2163. Data Concerning Use of Liquid-Oxygen Explosives in Germany, by G. S. Rice. 1920. 2 pp. Lists number of mines of different types where liquid-oxygen plants have been installed.
- †RI 2164. Oil Pipe Lines, by C. P. Bowie. 1920. 4 pp. Outlines procedure in installing a pipe line, describes buildings needed at a pumping station, and discusses administration.
- †RI 2165. Engineering Applied to Oil-Field Production Problems, by A. W. Ambrose. 1920. 6 pp. Stresses part played by engineering in conservation problems.
- †RI 2166. Relation of the Bureau of Mines to the Oil Industry, by F. G. Cottrell. 1920. 6 pp. Shows ways in which the Bureau of Mines is serving the oil industry.
- †RI 2167. Duties, Trials, and Difficulties of the Coal-Mine Fire Boss, and Cooperation of Officials with Him, by D. Harrington. 1920. 3 pp. Gives minimum qualifications for fire boss and a detailed schedule of duties.
- †RI 2169. Experimental Determination of Evaporation Losses from Crude Oil During Piping and Storage on Oil Leases, by A. R. Elliott. 1920. 3 pp. Gives results of experiments and draws conclusions regarding efficient storage.
- †RI 2170. Recovery of Gold from Black-Sand Tailings, by John Gross. 1920. 2 pp. Gives tables showing results of tests and demonstrates value of hand jigging and canvas-table concentration.
- †RI 2171. Talc Mining in New York, by R. B. Ladoo. 1920. 15 pp., 5 figs. Describes four groups of mines and plants in northern New York and gives flow sheets.
- †RI 2173. Effect of Ultraviolet Rays on the Eye, by C. E. Kindall. 1920. 2 pp. Warns of dangers of conjunctivitis from watching electric arc-welding with unprotected eyes.
- †RI 2174. Our Future Supply of Petroleum Products, by J. O. Lewis. 1920. 9 pp. Outlines the situation as regards supply and demand and lists future sources of supply.
- †RI 2175. Danger in Using Army Gas Masks in Mines, by G. S. Rice. 1920. 2 pp. States that Army masks do not supply oxygen in atmospheres lacking it and will not remove carbon monoxide, therefore this equipment cannot be used in mines.
- †RI 2176. Possibilities of Producing Oil from Oil Shale, by M. J. Gavin. 1920. 7 pp. Discusses possible sources of oil to supply current demand and describes retorting of oil shale.
- †RI 2177. The Petroleum Experiment Station of the Federal Bureau of Mines at Bartlesville, Okla., by A. W. Ambrose. 1920. 5 pp. Describes equipment and work of station.
- †RI 2178. Uses of Sulfuric Acid, by A. E. Wells. 1920. 3 pp. Describes uses of dilute acid, concentrated acid, and fuming acid.
- †RI 2179. Asbestos in South Africa, by Oliver Bowles. 1920. 2 pp. Gives location of deposits and quarrying methods.
- †RI 2180. Refining Problems, by H. H. Hill. 1920. 11 pp. Lists problems to be solved in refining petroleum and describes various types of plants.
- †RI 2181. Slate Mining in Maine, by Oliver Bowles. 1920. 3 pp., 2 figs. Describes successful use of underground methods.
- †RI 2182. Recoverable Oil in Byproduct Sands and Outcrops, by A. R. Elliott. 1920. 6 pp. Shows sources of recoverable oil near wells.
- †RI 2183. The Use of Bituminous Coal as Water-Gas Generator Fuel, by W. W. Odell. 1920. 2 pp. Shows superior value of water gas from bituminous coal over that from coke.
- †RI 2184. Coal-Washing Work at Northwest Experiment Station, Seattle, Wash., by Earl R. McMillan. 1920. 2 pp. Discusses tests to show coal-washing methods that will remove dirt without losing valuable coal.
- †RI 2185. Analyses of Air from Burning Building, by S. H. Katz. 1920. 2 pp. Includes detailed table of analyses.
- †RI 2186. Methods for the Judging of First-Aid Contests, by R. R. Sayers. 1920. 4 pp. Gives directions for scoring contestants and shows a score card.
- †RI 2187. Sparks from Steam Shovels and Locomotives as Causes of Premature Explosions, by S. P. Howell and J. E. Crawshaw. 1920. 22 pp. Describes six accidents caused by sparks and makes recommendations for preventing future explosions.
- †RI 2189. Fuel Wastes in Oil-Field Boilers for Drilling and Production, by A. W. Ambrose. 1920. 5 pp. Describes types of boilers used in oil fields and gives suggestions for more efficient firing.
- †RI 2190. The Mining and Preparation of Tripoli, by R. B. Ladoo. 1920. 9 pp., 2 figs. Discusses methods used at mines in Missouri-Oklahoma and Illinois districts and includes flow sheets and bibliography.
- †RI 2191. Treating Natural-Gas Gasoline to Meet the "Doctor Test," by D. B. Dow. 1920. 4 pp. Describes method of getting rid of objectionable sulfur compounds.
- †RI 2192. Comparison of Methods of Gold Recovery from Black Sand, by John Gross. 1920. 4 pp. Concludes that barrel amalgamation is most efficient method of treating black sand. Gives table of results by different methods.
- †RI 2193. Globe-Miami District Mine Rescue and First-Aid Association, by J. J. Forbes. 1920. 3 pp. Lists equipment and describes organization of Arizona first-aid group.
- †RI 2194. Fire Hazards in Metal Mines, by Byron O. Pickard. 1920. 2 pp. Notes 26 hazards observed in metal mines.
- †RI 2195. Hazards of Handling and Transporting Volatile Petroleum Products, by C. P. Bowie. 1920. 2 pp. Warns against danger of igniting vapors from hydrocarbons in tanks or other storage.
- †RI 2196. Structure in Bituminous Coals, by Reinhardt Thiessen. 1920. 4 pp. Describes plant substances that compose coal.
- †RI 2199. Tests of Miners' Flame Safety Lamps in Gaseous, Coal-Dust-Laden Atmospheres, by L. C. Isley and A. B. Hooker. 1920. 5 pp. Gives results of test of bonneted and unbonneted lamps, including Davy, Seippel, Clanny, Koehler, and Ackroyd & Best.
- †RI 2200. The Mining Company's Interest in the Educational Facilities of Its Community, by T. T. Read.

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1920. 2 pp. Stresses value of good educational facilities as attracting desirable type of miners to a given locality.

- †RI 2201. Use of the MacMichael Viscosimeter in Testing Petroleum Products, by W. H. Herschel and E. W. Dean. 1921. 12 pp. Notes advantages and disadvantages of MacMichael viscosimeter, describes apparatus in detail, and gives directions for use.
- †RI 2202. Properties of Typical Crude Oils from the Eastern Producing Fields of the United States, by E. W. Dean. 1921. 57 pp. Gives properties of crudes from New York, Pennsylvania, West Virginia, Maryland, Kentucky, Ohio, and Illinois, with comparative data for crudes from Kansas, Oklahoma, California, and Wyoming.
- †RI 2203. Consumption of Reagents Used in Flotation, by Thomas Varley. 1921. 4 pp. Lists amounts of reagents used in flotation of gold-silver ores, graphite ore, copper ores, lead ores, lead-silver ores, zinc ores, and others. (See also RI 2709, 2777, 2852, 2931, 3004, and 3112.)
- †RI 2205. Cyanide Treatment of an Amalgamation Tailing, by John Gross. 1921. 5 pp. Describes treatment of Alaska ore yielding gold and silver.
- †RI 2206. Investigation of Low-Grade and Complex Ores in Colorado, by R. R. Hornor and W. H. Coghill. 1921. 4 pp. Investigates possibility of reviving declining mining industry of Colorado by encouraging treatment of low-grade and complex ores.
- †RI 2207. Tests of Carbon Monoxide Detector in Mines, by D. Harrington and B. W. Dyer. 1921. 3 pp. Describes detector developed by Chemical Warfare Service.
- †RI 2208. Sand Filling in Stopes, by E. D. Gardner. 1921. 2 pp. Discusses method used in Arizona copper mine.
- †RI 2209. The Value of Oxygen Breathing Apparatus in Mine Rescue Operations, by D. J. Parker. 1921. 3 pp. Summarizes types and history of apparatus and emphasizes their value in mine disasters.
- †RI 2213. Investigations of Dust in the Air of Granite Working Plants, by S. H. Katz. 1921. 2 pp. Describes investigation conducted in connection with a study of industrial disease in a Vermont granite center.
- †RI 2214. Some Items of Investment, Expense, and Profit in Commercial Shale-Oil Production, by L. H. Sharp and A. T. Strunk. 1921. 3 pp. Briefly lists equipment needed, sources of income, and items chargeable to operating costs.
- †RI 2215. The Saybolt Furol Viscosimeter, by E. W. Dean. 1921. 4 pp. Points out features of Furol viscosimeter and notes differences between it and Universal viscosimeter.
- †RI 2217. Cooperative Mining at the Keely Mine, Dugger, Ind., by J. J. Bourquin. 1921. 3 pp. Describes cooperative methods in use at Indiana coal mine.
- †RI 2218. Explosion in High-Pressure Compressed-Air Line, by E. D. Gardner. 1921. 3 pp. Outlines causes of explosions in compressed-air lines.
- †RI 2219. The Gasoline Explosion at Memphis, Tenn., January 24, 1921, by D. B. Dow. 1921. 4 pp. Gives cause and effects of explosion and suggests safe practices in storing gasoline.
- †RI 2221. Cannel Coal in Southern Utah, by C. A. Allen. 1921. 3 pp. Describes and analyzes samples from bed of cannel coal in southern Utah.
- †RI 2223. Working for the Miner's Safety, by Dorsey A. Lyon. 1921. 3 pp. Tells of three phases of Bureau of Mines work for mine safety.
- †RI 2224. State Regulations on Accident Prevention Covering Electric Circuits in Coal Mines, by L. C. Hsley and R. A. Kearns. 1921. 7 pp. Abstracts State laws.
- †RI 2225. Gasoline Losses Due to Incomplete Combustion in Motor Vehicles, by A. C. Fieldner, A. A. Straub, and G. W. Jones. 1921. 19 pp., 10 figs. Describes results of tests of motor vehicles under various conditions and includes curves.
- †RI 2226. Dangers in Using Low-Grade Foreign Detonators, by C. E. Munroe. 1921. 2 pp. Gives warning against using inferior detonators.
- †RI 2227. Method of Controlling Gas Well, Alkali Butte, Wyo., by F. B. Tough. 1921. 2 pp. Describes unusual method of controlling well with gas flow of 6,000,000 cubic feet daily.
- †RI 2228. The Estimation of Small Quantities of Gold, Silver, and the Platinum Metals in Material High in Copper, by C. W. Davis. 1921. 5 pp. Compares results of "combination" and "all-fire" methods used on oxidized ores and methods used on copper sulfide ores and copper bullion.
- †RI 2229. A Convenient and Reliable Retort for Assaying Oil Shales for Oil Yield, by L. C. Karrick. 1921. 6 pp., 1 fig. Describes construction and use of apparatus and gives sketch.
- †RI 2230. Slate Dust in Asphalt Road-Surface Mixtures, by Oliver Bowles. 1921. 6 pp. Gives results of impact and compression tests and settlement and decantation tests of road mixtures made with slate flour.
- †RI 2234. Ten Years of Mine Rescue and First-Aid Training, by H. F. Bain. 1921. 8 pp. Summarizes achievements of Bureau of Mines in rescue and first-aid training.
- †RI 2235. Properties of Typical Crude Oils from the Producing Fields of the Rocky Mountain District, by E. W. Dean, M. B. Cooke, and A. D. Bauer. 1921. 50 pp. Gives properties of crudes from Colorado, Montana, and Wyoming, with comparative data on crudes from Pennsylvania, West Virginia, Ohio, Kentucky, Indiana, Illinois, Kansas, Oklahoma, and California.
- †RI 2236. Prevention of Evaporation Losses in Lease Tanks, by J. H. Wiggins. 1921. 7 pp., 3 figs. Describes tests of tanks in Oklahoma.
- †RI 2237. Some Factors Affecting Losses of Coal in Mining, by G. S. Rice. 1921. 6 pp. Stresses factors affecting percentage of coal recovered from American mines.
- †RI 2238. Iceland Spar, by Oliver Bowles. 1921. 6 pp. Lists and gives characteristics of calcite deposits in Iceland, California, Montana, Spain, and Argentina.
- †RI 2239. Losses in Aluminum and Aluminum-Alloy Melting, by R. J. Anderson. 1921. 6 pp. Includes information on types of furnaces, metal and fuel losses, and amount of aluminum melted in the United States.
- †RI 2240. Emergency Fans for Fighting Metal-Mine Fires, by Byron O. Pickard. 1921. 3 pp. Explains advantages of having fan to be used solely in fighting mine fires.
- †RI 2242. Coal-Dust Hazards in Industrial Plants, by L. D. Tracy. 1921. 6 pp., 1 fig. Warns against explosibility of pulverized coal and describes tests to prove it.
- †RI 2243. Picric Acid as a Blasting Agent, by C. E. Munroe and S. P. Howell. 1921. 15 pp. Gives history, characteristics, and uses of picric acid. Describes field demonstrations.
- †RI 2244. Value of Mixtures of Coke Breeze and Bituminous Coal as Fuel for a Hand-Fired Boiler, by John Blizard and James Neil. 1921. 27 pp., 3 figs. Describes tests of mixtures of coke breeze and bituminous coal, giving data on steaming value, smoke, fuel loss, draft, etc.
- †RI 2245. The Safety and Health Campaign in the Mining Camps of Utah, by C. A. Allen and A. L. Murray. 1921. 7 pp. Outlines program for campaign, gives specimen posters and pledge cards, and states results.

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- †RI 2246. Compressed-Air Blowers in Metal Mines, by D. Harrington. 1921. 5 pp. Includes temperature data for compressed-air blowers used underground.
- †RI 2247. The Chloride Volatilization Process, by Thomas Varley and C. C. Stevenson. 1921. 9 pp. Describes process especially adapted to treatment of oxidized and semioxidized and carbonate ores of copper, lead, and silver and summarizes experiments.
- †RI 2248. A Safety Cut-Out for Trolley Wires at Loading Chutes, by E. D. Gardner. 1921. 2 pp., 1 fig. Describes construction and operation of cut-out. Gives sketch.
- †RI 2249. The Effect of Crystalline Paraffin Wax Upon the Viscosity of Lubricating Oil, by E. W. Dean and L. E. Jackson. 1921. 3 pp. Gives results of tests to determine effect of paraffin content on lubricating oil.
- †RI 2250. Petroleum Production in South America with Relation to Recent Petroleum Legislation, by J. W. Thompson. 1921. 6 pp. Lists principal producing districts in South America, by countries.
- †RI 2251. Safety Work at Ironwood, Mich., by R. V. Ageton. 1921. 4 pp. Describes safety organization at iron mine.
- †RI 2253. High-Grade Talc and the California Talc Industry, by R. B. Ladoo. 1921. 7 pp., 2 figs. Defines high-grade talc and names characteristics. Describes milling methods used by several large companies and includes flow sheets.
- †RI 2254. Nature of Shale Oil Obtained from Oil-Shale Assay Retort Used by the Bureau of Mines, by Martin J. Gavin and Lewis C. Karrick. 1921. 11 pp. Consists largely of distillation analyses of samples.
- †RI 2255. An Unusual Hazard in Reopening Long-Flooded Timbered Metal Mines, by D. Harrington. 1921. 3 pp. Tells of ignition of gas (proved to contain methane) pocketed in flooded mines.
- †RI 2256. Notes on the Oil-Shale Industry, with Particular Reference to the Rocky Mountain District, by M. J. Gavin, H. H. Hill, and W. E. Perdue. 1921. 36 pp., 2 figs. Gives résumé of status of oil-shale industry, including its history in Scotland. A comprehensive bibliography is appended.
- †RI 2257. Quantitative Microscopic Determination of Chalcopyrite, Chalcocite, Bornite, and Pyrite in a Porphyry Ore, by R. E. Head. 1921. 5 pp. Describes microscopic work on copper sulfides in ore.
- †RI 2258. State Safety Regulations Governing Mine Telephones, by L. C. Hsley and R. A. Kearns. 1921. 7 pp. Abstracts laws governing telephones in 16 mining States.
- †RI 2259. Six-Year Accident Record of Mines of the Anaconda Copper Mining Co. in Montana, by D. Harrington. 1921. 12 pp. Tabulates record for 32 mines of company from 1915 to 1920.
- †RI 2260. Safety Organization of Old Dominion Mine at Globe, Ariz., by E. D. Gardner. 1921. 4 pp. Includes account of functioning of workmen's committee, which inspects mine at regular intervals and reports to mine inspector.
- †RI 2262. Gases Produced in the Use of Carbon Tetrachloride and Foamite Fire Extinguishers in Mines, by A. C. Fieldner and S. H. Katz. 1921. 6 pp., 1 fig. States that under tests in mines, fire extinguishers produced smoke irritating to eyes and respiratory passages.
- †RI 2263. Laboratory Studies of the Trent Process, by G. St. J. Perrott and S. P. Kinney. 1921. 18 pp. Describes Bureau of Mines tests of Trent process for cleaning coal, gives history of process, and includes table on fusion temperature of ash in raw and cleaned coal.
- †RI 2264. Separation of Sphalerite, Silica, and Calcite from Fluorspar, by John Gross. 1921. 3 pp. Describes results of tests by electrostatic separation.
- †RI 2265. Sanitation in Planning and Developing Oil-Shale Camps, by Arthur L. Murray. 1921. 7 pp. Discusses selection of site, water supply, sewage disposal, etc.
- †RI 2266. Leaching Iron Ores for Phosphorus, by R. M. Winslow. 1921. 3 pp., 1 fig. Describes tests that showed that amount of phosphorus dissolved was always greater with high concentration of solvents.
- †RI 2267. Slate as a Permanent Roofing Material, by Oliver Bowles. 1921. 5 pp. Suggests improvements possible in manufacture and classification and emphasizes roofer's responsibility in doing honest work.
- †RI 2268. Selection of Analysts for Color Work in Chemistry, by H. R. O'Brien. 1921. 3 pp. Discusses tests given in laboratory to determine fitness of chemists for colorimetric work.
- †RI 2270. Relation of Drilling Campaign to Income from Oil Properties, by W. W. Cutler, Jr., and W. S. Cinte. 1921. 11 pp. Shows how correct determination of drilling campaign may help to allow financial gain during depressed periods.
- †RI 2273. Compressed-Air-Operated Ventilation Doors in Arizona Copper Mines, by E. D. Gardner. 1921. 2 pp., 1 fig. Describes mechanism for operating doors and includes sketch.
- †RI 2274. Relation of Lead Poisoning in Utah to Mining, by Arthur L. Murray. 1921. 7 pp. Tabulates cases of lead poisoning, by occupations.
- †RI 2275. Rock-Strata Gases in Mines of the East Tintic Mining District, Utah, by G. E. McElroy. 1921. 3 pp. Describes heavy gases encountered in quartzite and gives evidence indicating that they have resulted from oxidation of sulfides.
- †RI 2276. Pressure-Volume Deviation of Methane, Ethane, Propane, and Carbon Dioxide at Elevated Pressures, by G. A. Burrell and G. W. Jones. 1921. 6 pp. Discusses tests to determine pressure-volume relations of several paraffin hydrocarbons.
- †RI 2277. Selected Bibliography on Oil Shale, by E. H. Burroughs and M. J. Gavin. 1921. 66 pp. Lists 295 items and includes index.
- †RI 2278. The Coking of Utah Coals, by S. W. Farr and T. E. Layng. 1921. 13 pp. Tabulates data on low-temperature carbonization, coke, and temperature.
- †RI 2279. Natural-Gas Gasoline Blends, by D. B. Dow. 1921. 2 pp. Tells of encouraging results of using naphtha obtained by rerunning kerosine as blending material.
- †RI 2280. Storing Carbide With Explosives, by Charles E. Munroe. 1921. 3 pp. Explains why it is unsafe to store carbide with explosives.
- †RI 2281. The Recovery of Unburned Fuel From Boiler-Furnace Refuse, by Thomas Fraser and H. F. Yancey. 1921. 3 pp. Describes washing tests to recover unburned fuel by crushing refuse, washing on tables, and removing slime.
- †RI 2282. Hot High-Nitrogen Gas in a Metal Mine, by G. E. McElroy. 1921. 3 pp. Gives analysis of hot, light gas resulting from rapid oxidation of finely disseminated pyrite.
- †RI 2283. The Utilization of Waste Slate as a Filler, by Oliver Bowles. 1921. 5 pp. Discusses use of pulverized slate as filler in rubber, linoleum, window shades, plastic roofing, and flooring.
- †RI 2285. Rate-of-Production Curve and Its Application to the Valuation of Oil Properties, by W. W. Cutler, Jr. 1921. 6 pp., 1 fig. Describes application of curve devised by author in determining rate of production of wells.
- †RI 2286. Miners' Field Day, Butte, Mont., by D. Harrington. 1921. 4 pp. Gives account of annual field day instituted by mining companies in 1918.
- †RI 2288. Bureau of Mines Experimental Tunnel for Studying the Removal of Automotive-Exhaust Gas, by A. C. Fieldner and J. W. Paul. 1921. 3 pp. Describes tunnel erected in Bureau's Experimental mine for studying ventilation problems that may

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- arise in connection with Holland Tunnel under Hudson River.
- †RI 2289. Bentonite, by R. B. Ladoo. 1921. 5 pp. Defines bentonite, discusses occurrence, names uses, and gives analyses.
- †RI 2290. Viscosities and Pour Tests of Typical Crude Oils from the Eastern and Rocky Mountain Producing Fields of the United States, by E. W. Dean, A. D. Bauer, and W. B. Lerch. 1921. 5 pp. Tabulates results of tests of crudes from New York, Pennsylvania, West Virginia, Ohio, Indiana, Illinois, Kansas, Oklahoma, Wyoming, California, Montana, and Colorado.
- †RI 2291. Dust Reduction by Wet Stoppers, by D. Harrington. 1921. 5 pp. Gives dust content of air in underground workings where drilling is done by various types of machines and describes use of wet stoppers.
- †RI 2292. Present Status of Coal Carbonization at Low Temperatures, by J. D. Davis. 1921. 11 pp. Defines low-temperature carbonization, lists products and their uses, and describes various processes.
- †RI 2293. Properties of Typical Crude Oils from the Producing Fields of Northern Texas, Northern Louisiana, and Arkansas, by E. W. Dean, M. B. Cooke, and C. R. Bopp. 1921. 50 pp. Gives exhaustive data for individual samples, listed by counties and fields.
- †RI 2294. National and International Mine Rescue and First-Aid Meets, by F. J. Bailey. 1921. 2 pp. Lists first-aid and mine rescue teams competing according to States.
- †RI 2295. Precautions to Be Observed in Entering Abandoned Exploratory Shafts and Pits, by Byron O. Pickard. 1921. 3 pp. Stresses importance of exercising care before entering abandoned workings.
- †RI 2296. High-Speed Hoisting in Illinois and Indiana Coal Mines and Controlling Apparatus to Prevent Hoisting Accidents, by J. J. Bourquin. 1921. 2 pp. Describes operation of rapid-hoisting system and tells of safety measure to prevent accidents.
- †RI 2297. Rock-Drilling Tests in the Tri-State District, by C. R. Forbes. 1921. 4 pp. Offers conclusions on changes in gage and length of drill steel. (See also IC 6002.)
- †RI 2298. Lignite Carbonization—Carbonized Residue Briquets, by W. W. Odell. 1921. 2 pp., 1 fig. Outlines cooperative experiments performed in North Dakota and describes and sketches apparatus.
- †RI 2299. A Fatal Quarry Accident from Falling Rock, by Oliver Bowles. 1921. 2 pp., 1 fig. Urges need of especial care where inclined open bedding planes occur in quarries.
- †RI 2300. Underground Loading Devices in Metal Mines, by C. L. Colburn. 1921. 19 pp. Describes 10 underground loaders and gives actual operating records.
- †RI 2301. Destructive Distillation of Mixtures of Oil and Coal, by J. D. Davis, P. B. Place, and G. S. Scott. 1921. 19 pp., 9 figs. Discusses investigations of Trent process, tabulates yields of distillation, gives analyses of tars and gases, and presents curves showing results.
- †RI 2302. Inspection and Assembly of Flame Safety Lamps at the Mine, by L. C. Ilsley. 1921. 3 pp. States that many accidents have been caused by use of improperly assembled lamps, points out common errors in assembling, gives rules for proper assembling, and quotes Pennsylvania mining law on use of flame safety lamps.
- †RI 2303. Methane in California Gold Mines, by B. O. Pickard and E. D. Gardner. 1921. 6 pp. Urges importance of ventilating coal mines to drive out methane given off by carbonaceous rocks and by timber decomposing under water.
- †RI 2304. The Treatment of Carbon Monoxide Poisoning, by R. R. Sayers and E. R. O'Brien. 1921. 4 pp. Outlines treatment of victims of poisoning.
- †RI 2306. Momentary Heating of Inflammable Dusts, by Guy B. Taylor, Horace C. Porter, and E. C. White, with a foreword by G. S. Rice. 1922. 20 pp., 3 figs. Gives results (with detailed tables) of tests with hot falling weight and of experiments using hot gas, both of which show the possibility of igniting dust clouds.
- †RI 2307. Silica, by R. B. Ladoo. 1922. 7 pp. Lists forms of silica used industrially, briefly discusses mining and milling method, and outlines uses.
- †RI 2308. Safety of Mine-Type Telephone, by L. C. Ilsley. 1922. 2 pp. Describes test to determine whether ordinary mine telephones are safe for use in gaseous atmospheres.
- †RI 2309. Compressed-Air Blowers as an Aid to Metal-Mine Ventilation, by R. V. Ageton. 1922. 5 pp. Concludes that compressed-air blowers, while an aid in ventilation, do not cool the air at distances greater than 50 feet from blower and in line with it.
- †RI 2310. Growing Need for Preservation of Mine Timber, by R. R. Hornor. 1922. 8 pp. Stresses need for conserving mine timber and notes saving possible by treating it before installation. (See also RI 2321.)
- †RI 2311. Conditions in the Feldspar Industry, by R. B. Ladoo. 1922. 10 pp., 1 fig. Points out principal factors affecting unsatisfactory conditions in industry.
- †RI 2312. Low-Temperature Distillation of Amalgams of Bituminous Noncoking Coal and Asphaltic Oils, by J. D. Davis and C. E. Coleman. 1922. 7 pp., 1 fig. States that results of tests show that amalgam yields twice as much gas as its constituents distilled separately and less than half as much tar oil.
- †RI 2313. Solubility of Oil Shales in Solvents for Petroleum, by M. J. Gavin and J. T. Aydelotte. 1922. 4 pp. Describes results of treatment of shales from Kentucky, Utah, Colorado, Wyoming, and California with carbon tetrachloride, carbon bisulfides, acetone, ether, benzol, and chloroform.
- †RI 2314. Milling Methods in the Tri-State Zinc District, by W. H. Coghill and C. O. Anderson. 1922. 14 pp. Discusses use of laboratory jig and later work in mill.
- †RI 2315. Placer-Mining Methods. 1922. 4 pp. Briefly describes use of hydraulic elevator, rubble elevator, gravel pumping, mechanical excavators, beach mining, etc., and includes bibliography.
- †RI 2318. The Unsaturated-Hydrocarbon Constituents of Gas from Destructive Distillation of a Water-Gas Tar and Coal Mixture, by R. L. Brown. 1922. 6 pp. Presents results of unsaturated hydrocarbons of gas produced by distilling water-gas tar-coal mixture in gas retort.
- †RI 2319. Prevention of Illness Among Miners, by R. R. Sayers. 1922. 9 pp. Describes methods of protecting miners exposed to carbon monoxide and the effect of this gas and of carbon dioxide, and stresses importance of adequate removal of floating siliceous dusts.
- †RI 2320. Performance of Fan-Pipe Installations in Metal Mines, by D. Harrington and G. E. McElroy. 1922. 4 pp. Summarizes problems to be solved in connection with use of fan-pipe installations in view of their increasing use for ventilating workings not reached by ordinary ventilating currents.
- †RI 2321. Mine-Timber Preservation, by R. R. Hornor and Geo. M. Hunt. 1922. 19 pp., 1 fig. Covers subject presented in RI 2310 in greater detail.
- †RI 2322. Properties of Typical Crude Oils from the Producing Fields of Kansas, by E. W. Dean, M. B. Cooke, and A. D. Bauer. 1922. 51 pp. Gives average gravities and sulfur content of 27 crudes.
- †RI 2323. The Smoke Problem, by O. P. Hood. 1922. 5 pp. Defines smoke problem and discusses causes of smoke.
- †RI 2324. Some Factors Affecting Products from Destructive Distillation of Oil Shales, by L. C. Karrick. 1922. 5 pp. Discusses effect of properties and physical

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- structure of shale, temperature lag, and rate of heat supply.
- †RI 2325. Fighting a Mine Fire with Its Own Gases, by C. A. Allen and A. C. Watts. 1922. 8 pp. Describes method and organization for fighting fire in Utah mine.
- †RI 2326. Platinum. 1922. 6 pp. Gives general information on properties, occurrence, uses, and metallurgy of platinum.
- †RI 2327. Soapstone, by R. B. Ladoo. 1922. 4 pp. Gives general information on properties, occurrence, production, and mining and milling methods.
- †RI 2329. Use of Low-Pressure Gas Burners in Oil-Field Boilers, by M. P. Youker. 1922. 8 pp. Presents operating data on firing rates, quantities of gas used, and combustion.
- †RI 2331. Water-Gas Tar Emulsions, by W. W. Odell. 1922. 5 pp. Defines water-gas tar and explains cause of formation of emulsions.
- †RI 2332. Analytical Distillations of Typical Shale Oils, by M. J. Gavin. 1922. 12 pp. Describes results of tests of oils distilled from Scottish, Utah, and Colorado shale.
- †RI 2333. Epsomite, by R. B. Ladoo. 1922. 5 pp. Gives properties, occurrence, production, methods of manufacture, and uses.
- †RI 2335. Tests of Hand Extinguishers on Zinc-Dust Fires, by S. H. Katz and J. J. Bloomfield. 1922. 6 pp. Shows that frothy mixtures had advantage over other extinguishers for zinc-dust fires in that no poisonous or irritating gases are evolved.
- †RI 2336. Bibliography of Literature on Sampling, by W. J. Sharwood and M. W. von Bernewitz. 1922. 85 pp. Includes nearly 1,000 references and a list of patents.
- †RI 2337. The Northwest Experiment Station of the Federal Bureau of Mines, by C. E. Williams. 1922. 4 pp. Describes work of station at Seattle, Wash.
- †RI 2338. Physiological Effects of Exposure to Low Concentrations of Carbon Monoxide, by R. R. Sayers, F. V. Meriwether, and W. P. Yant. 1922. 6 pp. Gives results of tests made in connection with ventilation investigations for Holland Tunnel.
- †RI 2339. Drilling and Dustiness of Metal-Mine Air, by D. Harrington. 1922. 6 pp. Tabulates results of tests with wet and dry drills.
- †RI 2341. Smokeless Fuel for Salt Lake City, by G. St. J. Perrott and H. W. Clark. 1922. 18 pp. Considers practicability of byproduct coking of Utah coal to supply smokeless fuel for domestic consumption.
- †RI 2342. Survey of Pacific Coast Petroleum Products, by Earl C. Lane. 1922. 7 pp., 2 figs. Gives analyses of aviation gasoline, motor gasoline, and petroleum spirits. (See also RI 2482 and 2511.)
- †RI 2343. Bibliography of Articles Relating to the Preservation of Mine Timber, by R. R. Hornor. 1922. 6 pp. Lists citations by years from 1883 to 1921.
- †RI 2344. Recovery of Gasoline From Uncondensed Still Vapors, by D. B. Dow. 1922. 26 pp., 6 figs. Shows possibilities of increasing yield from crude by recovering uncondensed vapors.
- †RI 2345. The Economic Relation of Accidents and Preventable Diseases to the Coal-Mining Industry, by Arthur L. Murray. 1922. 5 pp. Considers accidents in Utah coal mines in comparison with morbidity rates for typhoid and smallpox.
- †RI 2346. Acetylene as a Precipitant for Cyanide Solution, by John Gross. 1922. 2 pp. Concludes that acetylene is inert as a precipitant.
- †RI 2347. Garnet, by R. B. Ladoo. 1922. 16 pp., 2 figs. Discusses characteristics, occurrence, production, and mining and milling methods; includes bibliography.
- †RI 2350. The Sulfur Dioxide Leaching Process, by C. E. van Barneveld and E. S. Leaver. 1922. 15 pp., 3 figs. Describes method for treating nonsulfide copper ores.
- †RI 2351. Separation of Palladium and Platinum by Means of Dimethylglyoxime, by C. W. Davis. 1922. 2 pp. Describes tests to show that palladium can be precipitated free from platinum if the chlorides of these metals are treated with dimethylglyoxime at room temperature.
- †RI 2352. Kinds of Haulage and Cutting Machines in Coal Mines, by W. W. Adams. 1922. 4 pp. Lists haulage systems and mining machines in use, by States.
- †RI 2354. Mercury Poisoning, by R. R. Sayers. 1922. 6 pp. Gives preventive measures and advice to workmen exposed to mercury.
- †RI 2355. Determination of the Relative Comfort of Mine Working Places by Means of the Katathermometer, by D. Harrington and G. E. McElroy. 1922. 7 pp. Describes use of instrument, which gives exact numerical index of relative comfort of working places.
- †RI 2356. The Tannic Acid Method for the Quantitative Determination of Carbon Monoxide in the Blood, by R. R. Sayers and W. P. Yant. 1922. 7 pp. Describes simple method that requires little equipment or technical skill.
- †RI 2357. Mica, by Oliver Bowles. 1922. 46 pp., 3 figs. Gives data on origin and occurrence, world production, methods of mining and preparation, and uses.
- †RI 2358. Endurance Tests of Storage Batteries for Use in Permissible Mine Locomotives, by L. C. Iisley and E. B. Brunot. 1922. 4 pp. Discusses tests of battery cells manufactured by four companies.
- †RI 2360. Reported Instances of Successful First-Aid Treatment, by D. J. Parker. 1922. 3 pp. Cites 13 examples of efficient first-aid treatment reported by or through Bureau of Mines safety cars and stations.
- †RI 2361. The Spring Canyon Mine Rescue Association, by A. L. Murray. 1922. 3 pp. Tells of organization and activities of Utah association.
- †RI 2363. Helium, by R. B. Moore. 1922. 4 pp. Reviews history of discovery of helium and explains its value as a nonflammable lifting force for rigid airships.
- †RI 2364. Properties of Typical Crude Oils from the Producing Fields of Oklahoma, by E. W. Dean, A. D. Bauer, M. B. Cooke, and C. R. Bopp. 1922. 77 pp. Gives range of gravities and sulfur content.
- †RI 2365. Ignition of Coal Dust by Electric Arcs, by L. C. Iisley and E. J. Gleim. 1922. 7 pp. Describes tests to prove that coal dust in air can be ignited by electric arcs under conditions possible in mines and pulverized-coal plants.
- †RI 2366. Oklahoma Promotes Safety in Mines, by D. J. Parker. 1922. 4 pp. Includes letter of warning and suggestions sent by Oklahoma district mine inspector to mining companies in his district.
- †RI 2367. Official Approval of Burrell Methane Indicator, by L. C. Iisley. 1922. 3 pp. Gives instructions for operating indicator and states scale of accuracy it had to meet in tests.
- †RI 2368. Temperature-Pressure Curves of Petroleum Products, by M. B. Cooke. 1922. 2 pp., 2 figs. Tabulates results of bomb tests of casinghead gasoline, motor gasoline, kerosene, and transformer oil.
- †RI 2371. Why Miners' Portable Electric Lights Require Safety Devices, by L. C. Iisley. 1922. 9 pp., 2 figs. Gives results of five groups of tests to prove that an adequate current-interrupting safety device is needed on miners' electric lamps.
- †RI 2372. Keeping Up to Date in Safety Methods in Coal Mining, by D. Harrington. 1922. 2 pp. Stresses importance of mining companies requiring superintendents, foremen, fire bosses, and shot firers to keep informed on State laws and up-to-date practice.
- †RI 2373. Fuel Economy from Old Plant Equipment, by A. R. Mumford. 1922. 4 pp. Urges tests of plant boiler

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- equipment to check its performance and gives results of specimen tests.
- †RI 2374. Summary of Investigations of Dust and Ventilation in Metal Mines, by D. Harrington. 1922. 6 pp. Includes bibliography of all Bureau of Mines reports on subject.
- †RI 2377. Storage and Transportation of Portland Cement, by W. M. Myers. 1922. 5 pp. Gives results of investigation to determine causes of deterioration in transit and in storage. Includes bibliography.
- †RI 2378. Determination of Suspended Matter in Gases by Collection on Filter Paper, by S. H. Katz and G. W. Smith. 1922. 6 pp., 1 fig. Describes use of tar camera.
- †RI 2380. Use of Geophone in Locating Compressed-Air Leaks, by Byron O. Pickard. 1922. 2 pp. Tells of successful use of Bureau of Mines geophone in locating leaks.
- †RI 2381. The Rate of Reduction of Hematite to Magnetite by Methane, by C. M. Bouton. 1922. 9 pp. Includes results of experiments to find under what conditions of time of contact methane becomes effective as a reducer.
- †RI 2382. The White Clay Industry in the Vicinity of Langley, S. C., by W. M. Weigel. 1922. 6 pp. Describes mining and preparation of white clays for market.
- †RI 2383. Ignition of Gas by Electric Detonators, by L. C. Hsley and A. B. Hooker. 1922. 10 pp., 1 fig. Gives results of tests of iron and copper leg wires in natural gas, with currents of various values passed through the wires.
- †RI 2384. Failure of Center Shots in Blasting, by L. C. Hsley and A. B. Hooker. 1922. 10 pp., 2 figs. Covers tests to discover why shots that miss in a group fired by a blasting machine are often in the center.
- †RI 2385. Tellurium, by H. A. Doerner. 1922. 3 pp. Discusses properties, sources, uses, metallurgy, qualitative and quantitative determination.
- †RI 2386. Comminuted Smokeless Powder as a Blasting Agent, by C. E. Munroe and S. P. Howell. 1922. 19 pp., 1 fig. States that comminuted smokeless powder can be used to advantage in blasting stumps, boulders, and ditches, but is unsuitable for use in gassy or dusty atmospheres.
- †RI 2390. The New Albany Shale of Indiana, by J. R. Reeves. 1922. 8 pp., 1 fig. Includes discussion of physical and chemical characteristics, map showing position of outcrop, and distillation analyses of shale oil.
- †RI 2391. Underground Hygiene and Sanitation, by R. E. Sayers. 1922. 11 pp. Discusses importance of pure drinking water, sewage disposal, and adequate ventilation.
- †RI 2392. A New Instrument for Sampling Aerial Dust, by Leonard Greenburg and George W. Smith. 1922. 3 pp. Describes impinger-bubbler apparatus.
- †RI 2393. Production of Alumina from Clay Tests on the Miguet Process, by C. E. Williams and C. E. Sims. 1922. 2 pp. Outlines process for preparing alkali aluminate by fusing clay, lime, and scrap iron with a reducing agent in the electric furnace.
- †RI 2394. Gum-Forming Constituents in Gasoline, by N. A. C. Smith, and M. B. Cooke. 1922. 12 pp. Concludes that gummy and resinous deposits are caused by oxidation.
- †RI 2396. Feldspar Mining and Milling Near Keene, N. H., by R. B. Ladoo. 1922. 6 pp., 1 fig. Describes deposit and methods of mining and milling.
- †RI 2397. Gunite in Metal Mines, by Byron O. Pickard. 1922. 30 pp., 1 fig. Discusses uses and application of gunite, lists cost data, and includes bibliography.
- †RI 2398. Explosion-Proof Electrical Equipment, by L. C. Hsley. 1922. 2 pp. Gives 10 reasons why permissible equipment is safer than unapproved types.
- †RI 2400. Fire and Explosion Hazards of Petroleum and Petroleum Products, by S. H. Katz and N. A. C. Smith. 1922. 11 pp., 3 figs. Explains hazards of petroleum and its products and gives general information on volatility, flash point, explosive limits, etc.
- †RI 2401. Stripping Problems in Limestone Quarries of the Shenandoah Valley, by Oliver Bowles. 1922. 6 pp. Cites difficulties experienced in removing overburden and suggests that mechanical removal of overburden might reduce stripping expense.
- †RI 2403. Use of Bituminous Coal in Househeating Furnaces, by Rudolf Kudlich. 1922. 2 pp. Gives simple directions for firing furnace, regulating drafts, etc.
- †RI 2405. State and Federal Electrical Shot-Firing Regulations, by L. C. Hsley. 1922. 17 pp. Includes regulations for quarries, tunnels, metal mines, and coal mines.
- †RI 2406. Titanium, by R. J. Anderson. 1922. 12 pp. Discusses properties, uses, and preparation, and includes bibliography.
- †RI 2407. Experiments in Underground Signaling with Radio Sets, by C. L. Colburn, C. M. Bouton, and H. B. Freeman. 1922. 4 pp., 7 figs. Concludes that electromagnetic waves may be made to travel through solid strata, although no practical method of using wireless waves for underground communication was indicated.
- †RI 2408. Methods for Determining Sediment in Fuel Oils, by A. D. Bauer. 1922. 4 pp. Describes results of tests by benzol-extraction method, A. S. T. M. centrifuge method, and Dean and Lerch method.
- †RI 2410. Contraction and Shrinkage of Nonferrous Alloys as Related to Casting Practice, by R. J. Anderson. 1922. 13 pp. Defines terms, reviews history of subject, and describes effects of various factors on contraction. Includes bibliography.
- †RI 2411. Arc Regulation in Electric Furnaces and Pilot-Light Control, by C. E. Sims. 1922. 2 pp., 1 fig. Describes apparatus that furnishes an accurate and sensitive means of control at low cost.
- †RI 2412. Comparative Steaming Tests of Nenana Lignite and Matanuska Bituminous Coals, by J. A. Davis and Paul Hopkins. 1922. 9 pp. Discusses tests of Alaska coals.
- †RI 2413. Bureau of Mines Investigates Gold in Oil Shales and Its Possible Recovery, by Thomas Varley. 1922. 10 pp., 1 fig. Concludes that any gold present in shales can be determined by the fire-assay methods, but that only a small percentage of the gold shown to be present can be recovered by cyanidation and chlorination treatment.
- †RI 2415. Distillation Gases Yielded by Trent Amalgams and Ethylene Found Therein as a Source of Alcohol, by J. D. Davis. 1922. 8 pp., 2 figs. Describes tests to show that Trent amalgams yield gases intermediate between those from coal and oil in quantity and quality.
- †RI 2416. Properties of Typical Crude Oils from the Producing Fields of Southern Louisiana and Southern Texas, by N. A. C. Smith, M. B. Cooke, and A. D. Bauer. 1922. 69 pp., 1 fig. Tabulates results of tests of crudes from Texas, Louisiana, Arkansas, California, Illinois, Indiana, Kansas, Kentucky, Ohio, Oklahoma, Pennsylvania, West Virginia, and Wyoming.
- †RI 2417. The Production of Carbon Black from Natural Gas by the High-Voltage Arc, by J. J. Jakosky. 1922. 10 pp., 5 figs. Summarizes investigations to determine whether a higher recovery of carbon black from natural gas is possible.
- †RI 2419. Regulations Safeguarding Coal-Cutting Machines, by L. C. Hsley. 1922. 9 pp. Quotes regulations of 11 States and United States.
- †RI 2420. Experiments on Back Pressure on Oil Wells, by T. E. Swigart. 1922. 9 pp. Describes tests of two wells in Oklahoma producing by gas pressure.
- †RI 2421. Natural Gas as a Factor in Oil Migration and Accumulation in the Vicinity of Faults, by R. van A. Mills. 1922. 6 pp. States that faulting that has yielded open fissures has strongly affected migration and accumulation of oil and gas.

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- †RI 2422. The Explosibility of Methane-Air and Gasoline-Air Mixtures as Related to the Design of Explosion-Proof Electric Motors, by E. J. Gleim. 1922. 7 pp., 1 fig. Stresses fact that motors to be used where explosive mixtures of volatile gasoline vapors and air may accumulate should have twice protection against communicating explosion to outside air than where used in methane-air mixtures.
- †RI 2424. Use of the Churn Drill at Lime-Plant Quarries, by Oliver Bowles. 1922. 7 pp. Describes various types of drills, lists advantages claimed for churn drill, and gives conditions disadvantageous for use.
- †RI 2425. A Section Through the New Albany Shale, by J. R. Reeves. 1922. 5 pp., 1 fig. Discusses study of core drilled through New Albany shale in Indiana.
- †RI 2426. Fire and Ventilation Doors in Metal Mines, by D. Harrington. 1922. 5 pp. Emphasizes importance of being able to isolate various sections of metal mines by providing substantially built doors that can be shut when necessary.
- †RI 2427. Rock-Strata Gases in Mines of a Nevada Mining District, by E. D. Gardner. 1922. 4 pp. Gives analyses of gas samples and concludes that such gases are given off as free nitrogen from rock mass.
- †RI 2429. Quarry Problems from the Engineer's Viewpoint, by Oliver Bowles. 1923. 5 pp. States that many quarry problems can be solved by application of engineering knowledge to operating practice.
- †RI 2431. Mining Diatomaceous Earth at Lompoc, Calif., by E. D. Gardner. 1923. 2 pp. Describes deposit and mining methods.
- †RI 2432. Coal Analyses from Twenty-Five Laboratories Compared, by A. C. Fieldner, H. M. Cooper, and F. D. Osgood. 1923. 11 pp., 5 figs. Compares analyses of anthracite, coke, semibituminous coal, gas coal, and steaming coal.
- †RI 2433. Metallurgical Possibilities of the Desclozite Ores at Goodsprings, Nev., by H. A. Doerner. 1923. 19 pp. Concludes that to obtain a good grade of vanadium concentrate and fair recovery of vanadium, ore would have to be crushed to pass a 48-mesh or even a 60-mesh screen; principal difficulty would be to find satisfactory market.
- †RI 2434. Permissible Electric Drills, by H. B. Brunot and H. B. Freeman. 1923. 9 pp. Describes methods of conducting tests of electric drills for permissibility.
- †RI 2436. Effect of Cartridge Diameter on the Strength and Sensitiveness of Certain High Explosives, by S. P. Howell and J. E. Crawshaw. 1923. 7 pp., 3 figs. Gives results of tests of 40- and 60-percent strength explosives.
- †RI 2437. List of Publications on Ceramic Investigations, United States Bureau of Mines. 1923. 5 pp. Revised as RI 2645.
- †RI 2438. Tests of Large Boiler Fired with Powdered Coal, by Henry Kreisinger and John Blizard. 1923. 2 pp. Tabulates principal results obtained.
- †RI 2441. Report of Lignite-Carbonizing Experiments Conducted at Grand Forks in 1922, by W. W. Odell. 1923. 26 pp., 4 figs. Describes construction of lignite carbonizer, easily constructed and operated, and shows cost of making lignite char and briquets in curves.
- †RI 2442. The Use of Vaportight Tankage in the Oil Fields, by Ludwig Schmidt. 1922. 11 pp., 2 figs. Emphasizes fact that all vaportight equipment, such as valves and hatches, needs constant attention to remain efficient.
- †RI 2443. Combustion Products from a Radiant-Type Natural-Gas Heater and Suggestions Regarding Its Operation, by G. W. Jones, W. P. Yant, and L. B. Berger. 1923. 15 pp., 1 fig. Describes and sketches testing apparatus and gives results obtained with special emphasis on liberation of carbon monoxide and directions for proper adjustment of such heaters.
- †RI 2445. The Value of Oxygen Breathing Apparatus to the Mining Industry, by E. H. Denny and M. W. von Bernwitz. 1923. 6 pp. Reviews history of use of rescue apparatus in the United States, emphasizes its value at mine disasters, and lists number of disasters where it was used.
- †RI 2446. Rock Loading at Lime-Plant Quarries, by Oliver Bowles. 1923. 5 pp. Gives advantages and disadvantages of hand loading and of steam shovels.
- †RI 2447. Condensation Losses Due to Transmission of Carbureted Water Gas Under High Pressure, by W. A. Dunkley. 1923. 7 pp. Concludes that loss due to condensation is a practically negligible factor.
- †RI 2448. Preliminary Investigation of Brattice Cloth Used in Coal Mining, by G. S. Rice, J. W. Paul, and E. H. Denny. 1923. 4 pp. Tabulates data to show wide variations in conditions of use of brattice cloth, particularly with respect to quantity, cost, and life in Alabama, Pennsylvania, Utah, Indiana, Illinois, Colorado, and Nova Scotia.
- †RI 2449. Bureau of Mines Approval System as Applied to Permissible Storage-Battery Locomotives (First Complete Investigation Under Schedule 15), by L. C. Hsley, and H. B. Brunot. 1923. 8 pp. Covers the inspection and test of a storage-battery locomotive manufactured by the Geo. D. Whitcomb Co., Rochelle, Ill., to which Approval 1500 was assigned.
- †RI 2450. Petroleum Engineering in the Skull Creek Oil Pool, Northeastern Osage County, Okla., by T. E. Swigart. 1923. 9 pp., 1 fig. Includes engineering data compiled in connection with experiments to determine effect of back pressure on oil wells.
- †RI 2452. Jet, by W. M. Myers. 1923. 4 pp. Gives characteristics of jet and discusses history of industry in England; states that demand depends upon current mode in jewelry; includes bibliography.
- †RI 2453. Morbidity Studies as an Aid in Preventing Illness Among Miners, by R. R. Sayers. 1923. 6 pp. Stresses necessity of mining companies keeping records of illness among employees and their families.
- †RI 2454. Transportation Systems at Lime-Plant Quarries, by Oliver Bowles. 1923. 6 pp. Discusses trackage, quarry cars, haulage on inclines, and costs.
- †RI 2455. How Steam-Production Costs Were Reduced in a Hand-Fired Return Tubular Boiler, by A. R. Mumford. 1923. 14 pp., 1 fig. Describes tests that reduced fuel costs from \$0.5287 to \$0.3540 per 1,000 pounds of steam.
- †RI 2456. Effects of Temperature and Time of Reaction in Distilling Oil Shales on the Yields and Properties of the Crude Oils, by L. C. Karrick. 1923. 8 pp. Concludes that changes in quality of crude shale oils produced by varying distillation rates may be due to temperature at which decomposition occurred and the extent to which thermal reaction progressed; also that oils produced at slow distillation rates are produced at much lower temperatures than oils formed by rapid distillation.
- †RI 2457. Putting Safety Over in a Small Mine, by Arthur L. Murray. 1923. 5 pp. Outlines scheme for popularizing safety measures in a mine.
- †RI 2458. Abstracts from the Literature on Treatment of Manganese-Silver Ores, by G. H. Clevenger and Alphonso Cornejo. 1923. 14 pp. Abstracts 37 reports.
- †RI 2459. A Simple Method for the Determination of Tin in Iron and Steel, by E. P. Barrett and J. D. Sullivan. 1923. 4 pp. Describes gravimetric method, volumetric method, and sulfide method, rejecting them all as being too lengthy, and suggests new modification of well-known fusion method.
- †RI 2462. The Treatment of Natural-Gas Gasoline to Meet the Doctor Test, by D. B. Dow. 1923. 13 pp., 2 figs. Describes methods of testing for sulfur and removing sulfur from gasoline.

†Out of print.

Reports of Investigations

- †RI 2463. Utilization of Waste Rock at Lime Plants, by Oliver Bowles. 1923. 5 pp. Suggests various uses for waste rock, such as in ballast and concrete aggregate, as chicken grit, agricultural limestone, and filler.
- †RI 2464. Physiological Effect of High Temperatures and Humidities with and without Air Movement, by R. R. Sayers and D. Harrington. 1923. 7 pp., 1 fig. Describes results of tests of persons remaining at rest in air at various temperatures and humidities.
- †RI 2465. Mine Timber in Illinois Coal Mines, by Harry E. Tuft. 1923. 5 pp. Tells of timbering methods and costs in district.
- †RI 2466. An Economic Study of the New Albany Shale, by J. R. Reeves. 1923. 19 pp. Discusses location of deposit, transportation facilities, quarrying methods, blasting practice, and retorting data.
- †RI 2468. Monel Metal as a Material for Flame Safety Lamp Gauzes, by A. B. Hooker and R. A. Kearns. 1923. 14 pp. Gives results of tests to show that Monel metal is satisfactory for flame-lamp gauzes.
- †RI 2469. The Desulfurization of Coke by Air, by A. R. Powell. 1923. 6 pp. Concludes that, if free sulfur could be completely removed, metallurgical coke could be improved by air treatment.
- †RI 2470. Combustion of Powdered Coal, by Henry Kreisinger and John Bilzard. 1923. 4 pp., 2 figs. Describes tests that showed that powdered coal may be burned with greater thermal efficiency for steam raising than by any other methods.
- †RI 2473. Globe-Miami Mine Rescue Maneuvers, by E. D. Gardner. 1923. 4 pp., 1 fig. Describes "fire drill" under conditions approximating those at a mine fire.
- †RI 2475. The Metallurgical Treatment of Zinc-Retort Residues, by B. M. O'Harra. 1923. 12 pp. Discusses direct smelting in blast furnace, burning and sintering, dry screening, magnetic separation, wet concentration, burning to produce zinc oxide, and miscellaneous processes.
- RI 2476. Dangers of and Treatment for Carbon Monoxide Poisoning, by R. R. Sayers and W. P. Yant. 1923. 11 pp. Gives properties of carbon monoxide, stresses its dangers, and describes physiological effects and treatment.
- †RI 2477. Barite and Ocher in the Cartersville (Ga.) District, by W. M. Weigel. 1923. 11 pp. Describes properties, mining and milling methods, and uses.
- †RI 2479. Quarrying to Obtain a Uniform Lime Product, by Oliver Bowles. 1923. 6 pp., 2 figs. Suggests methods of obtaining uniform selection in flat-lying and steeply inclined beds and of disposing of inferior rock.
- †RI 2480. Fluorspar Mining in the Western States, by R. B. Ladoo. 1923. 35 pp., 6 figs. Describes deposits and mining and milling methods in New Mexico, Arizona, Nevada, California, Colorado, Utah, and Washington.
- †RI 2482. Survey of Pacific Coast Petroleum Products. Part 2. Lubricating Oils, by E. C. Lane and N. F. LeJeune. 1923. 26 pp. Discusses application to California lubricants of Federal Specifications Board specifications. (See also RI 2342 and 2511.)
- †RI 2484. Why Not Scrap "the Davy," by J. W. Paul and A. B. Hooker. 1923. 3 pp. Cites instances of danger of using Davy lamps and urges that all now in use should be discarded.
- †RI 2485. The Reduction of Iron Oxides by Fuel Gases, by E. D. Eastman. 1923. 14 pp., 5 figs. Describes tests with coal gas, water gas, and producer gas.
- †RI 2486. The Pyrotannic Acid Method for the Quantitative Determination of Carbon Monoxide in Blood and Air, by R. R. Sayers, W. P. Yant, and G. W. Jones. 1923. 6 pp., 1 fig. Gives detailed description of compact apparatus for quantitative determination of carbon monoxide in blood and air.
- †RI 2487. Gasoline Saved on Government Trucks by Adjusting Carburetors by Exhaust-Gas Analysis, by G. W. Jones and A. C. Fieldner. 1923. 13 pp., 3 figs. Concludes that adjustable carburetors become adjusted to give too rich a mixture to give most efficient results as time lapses and should therefore be checked every 2 months.
- †RI 2488. Who May Set Off Blasts in Coal Mines, by L. C. Hsley. 1923. 9 pp. Abstracts State laws on shot-firing, grouping similar laws under appropriate headings.
- RI 2489. Comparison of Gas Masks, Hose Masks, and Oxygen Breathing Apparatus, by S. H. Katz and J. J. Bloomfield. 1923. 5 pp. Compares advantages and limitations of three types of apparatus.
- †RI 2491. Hydrogen Sulfide as an Industrial Poison, by R. R. Sayers, C. W. Mitchell, and W. P. Yant. 1923. 6 pp. Describes pathological effects of hydrogen sulfide poisoning.
- *RI 2492. Results of Assays of the New Albany Oil Shale, by J. R. Reeves. 1923. 11 pp., 2 figs. Gives results of analyses of numerous samples of Indiana shale.
- †RI 2494. Atmospheric Conditions and Physiological Effects Produced on Trainmen by Locomotive Smoke in the Aspen and the Wasatch Tunnels of the Union Pacific Railroad, by S. P. Kinney. 1923. 13 pp., 1 fig. Explains accidents to men in tunnels as due to asphyxiation from carbon monoxide and suggests use of air-line respirators as protection against tunnel gases.
- †RI 2496. Platinum Assays and Platinum Promotions, by S. C. Lind, C. W. Davis, and M. W. von Bernerwitz. 1923. 21 pp. Issues warning to public to be wary of helping to promote projects for mining platinum ores without careful assay of specimens.
- †RI 2497. Gases Liberated by High-Voltage Insulator Testing Apparatus, by G. W. Jones and W. P. Yant. 1923. 4 pp. States that gases liberated during tests of insulators with 90,000-volt "flash-over" 60-cycle testing apparatus are mainly ozone.
- †RI 2498. Disastrous Inflammation of Coal Dust in Excavating a Mine Dump, by C. A. Herbert. 1923. 2 pp. Suggests that railway companies loading old dirt piles containing coal dust wet down such piles for several days before disturbing them.
- †RI 2499. Carbon Tetrachloride Extinguisher on Electric Fires, by S. H. Katz, E. J. Gleim, and J. J. Bloomfield. 1923. 16 pp., 2 figs. Stresses fact that gases evolved from use of carbon tetrachloride as a fire extinguisher are poisonous and highly dangerous in absence of ventilation and in close confinement.
- RI 2502. The Use of Oxygen or Oxygenated Air in Metallurgical or Allied Processes, by F. W. Davis. 1923. 48 pp., 2 figs. Presents results of study of ferromanganese manufacture by coke-furnace process, as an example of a method that might be used with other and more difficultly reducible ferro-alloys.
- †RI 2503. Some General Considerations of the Gummy Meter Problem in the Gas Industry, by R. L. Brown. 1923. 8 pp. Holds that primary control for gummy deposits is in carbureting units.
- †RI 2504. Test Papers for Estimating Hydrocyanic Acid Gas in Air, by S. H. Katz and E. S. Longfellow. 1923. 4 pp., 1 fig. Describes development of series of color-test papers for detecting HCN vapor in air of tanks and apparatus and in ships and buildings after fumigation.
- †RI 2505. Sulfur Trioxide Smoke Tubes for Determining Air Currents, by S. H. Katz and J. J. Bloomfield. 1923. 1 p., 1 fig. Describes apparatus and gives sketch.
- †RI 2506. Field Investigations on Trailing Cables Used on Coal-Cutting Outfits, by L. C. Hsley and H. B. Freeman. 1923. 3 pp. States that searching field tests have shown that concentric all-rubber-covered type

†Out of print.

- of cable is preferable to types covered with weather-proof braid.
- †RI 2507. Oxygen-Oil Explosions, by M. D. Hersey. 1923. 9 pp. Lists variables involved in explosions, describes heat-transfer and explosibility experiments, and includes bibliography of 41 items. (See also RI 2521 and 2555.)
- †RI 2509. Experiments on Fan-Pipe Installations at Butte, Mont., by G. E. McElroy and A. S. Richardson. 1923. 14 pp. Discusses tests to determine friction factors in galvanized-iron and canvas-pipe installations.
- †RI 2510. The Use of Highly Volatile Natural-Gas Gasoline as a Refrigerant, by L. D. Wyant. 1923. 10 pp., 2 figs. Describes results of experimental runs using gasoline as a refrigerant and installations used.
- †RI 2511. Survey of Pacific Coast Petroleum Products. Part 3. Burning and Fuel Oils, by E. C. Lane and N. F. LeJeune. 1923. 2 pp. Discusses application to California burning and fuel oils of Federal Specifications Board specifications. (See also RI 2342 and 2482.)
- †RI 2512. Graphite for Steel-Melting Crucibles, by R. T. Stull and G. A. Bole. 1923. 6 pp. Concludes, after numerous tests, that superior steel-melting pots can be made from American graphites bonded with American clays.
- †RI 2513. Preparation and Detonating Properties of Cyanuric Triazide, by C. A. Taylor and W. H. Rinkenbach. 1923. 4 pp. States that cyanuric triazide is a very efficient detonating agent but is too sensitive to handle safely in large quantities.
- †RI 2517. Comparative Engine Tests with Crude, Acid-Refined, and Silica-Gel-Refined Motor Benzol, by A. C. Fieldner and G. W. Jones. 1923. 2 pp. Describes results of tests showing that no engine trouble developed when acid-refined or silica-gel-refined motor-benzol fuel was used.
- †RI 2518. Forms of Sulfur in Steamed Coke and Their Action in the Blast Furnace, by John H. Thompson. 1923. 7 pp. Suggests two ways of correcting sulfur trouble in blast furnaces: (1) Surface sulfur could be removed by some such process as steaming; (2) it could be prevented from entering spongy iron at this zone by dipping coke in some material that would absorb sulfur more readily than does iron.
- †RI 2519. Anthracite Substitutes, by O. P. Hood. 1923. 4 pp. Discusses use of anthracite steam sizes, bituminous smokeless, bituminous, briquets, oil, and gas.
- RI 2520. Fuels Available for Domestic Use as Substitutes for Anthracite Coal, by Rudolf Kudlich. 1923. 7 pp. Describes fuels listed in RI 2519 in greater detail.
- †RI 2521. Oxygen-Oil Explosions, by J. J. Jakosky and E. W. Butzler. 1923. 4 pp., 3 figs. Presents part 2 of investigation and covers spontaneous ignition of metals in oxygen under pressure. (See also RI 2507 and 2555.)
- †RI 2524. Progress in Blast-Furnace Research, by P. H. Royster, T. L. Joseph, and S. P. Kinney. 1923. 6 pp. Outlines status of blast-furnace metallurgy in the light of results obtained in Bureau of Mines experimental furnace at Minneapolis.
- †RI 2526. Strength and Sensitiveness of TNT as Determined by the Laboratory "Sand-Test" Bomb, by C. A. Taylor and R. D. Leitch. 1923. 5 pp. Gives results of tests that showed the fine crystals from same solvent are slightly more sensitive and that fusing TNT decreases its strength and sensitiveness.
- †RI 2527. Air-Measurement Methods for Experimental Work on Fan-Pipe Installations, by G. E. McElroy and A. S. Richardson. 1923. 2 pp. Includes estimate of value of pitot tubes and anemometers.
- †RI 2528. The Transportation of Explosives in and About Mines, by L. C. Hsley. 1923. 8 pp. Abstracts State safety laws.
- †Out of print.
- †RI 2530. Lifting Costs at Oil-Well Properties, by H. C. George. 1923. 8 pp., 1 fig. Tabulates various costs comprising total.
- †RI 2531. Effect of Cooling Systems on Evaporation Losses of Gasoline, by Ludwig Schmidt. 1923. 12 pp., 4 figs. States that unless cooling systems are installed on vaportight tanks they are ineffective, but that, if tanks are tight, water sprays have maximum cooling effect.
- †RI 2532. Drilling and Broaching in Slate Quarries, by Oliver Bowles. 1923. 6 pp. Describes new method as substitute for channeling and blasting, which is slow but damages rock so little that percentage of usable slate is increased.
- †RI 2533. The Preparation and Properties of Normal Lead Trinitroresorcinate, by C. A. Taylor and W. H. Rinkenbach. 1923. 6 pp. States that normal lead trinitroresorcinate can be prepared by following patent directions, is insensitive to friction, and cannot be used as an initiator of military high explosives, but will detonate some industrial dynamites.
- †RI 2534. Bibliography of Magnesians Cements, by G. H. West, R. L. Sebastian, and W. A. Darrow. 1923. 15 pp. Lists 211 items.
- †RI 2535. Who Pays for the Accidents, by R. V. Ageton. 1923. 4 pp. Presents data to show large proportion of accidents occur during first months of employment.
- †RI 2537. Relation of Operating Practice to Composition of Light Oil from Carbureted Water Gas, by R. L. Brown, E. F. Pohlman, and H. G. Berger. 1923. 9 pp., 2 figs. Concludes that time and contact factors in cracking are tangible control measures, that temperature at which cracking takes place affects gum-forming constituents in gas, and that gas oils of different properties give rise to different amounts of such constituents.
- †RI 2539. Carbon Monoxide Hazards from Tobacco Smoke, by G. W. Jones, W. P. Yant, and L. B. Berger. 1923. 6 pp. Describes tests that show concentrated smoke does not reach alveoli of lungs and that maximum average concentration of carbon monoxide drawn into lungs does not exceed 0.01 percent.
- †RI 2540. Friction Factors for Fan Piping Used in Mine Ventilation, by G. E. McElroy and A. S. Richardson. 1923. 15 pp., 5 figs. Gives tabulation of test results and makes recommendations regarding installations of fan piping.
- †RI 2541. Electrical Safety Inspection: Suggestions for Mine Safety Engineers, by L. C. Hsley. 1923. 10 pp. Revised as IC 6098.
- †RI 2542. Graphites for Brass-Melting Crucibles, by R. T. Stull and L. E. Geyer. 1923. 5 pp. While not drawing definite conclusions, states that tests indicate that American bond clays and Alabama graphite can be used to make superior brass-melting crucibles.
- †RI 2544. Lead-Zinc Separation by Volatilization, by G. L. Oldright. 1923. 11 pp. States that, in view of prospective high price of lead, increasing efforts will be made to recover it from zinc concentrates, and that the volatilization process is particularly suitable for use in zinc-retort plants.
- †RI 2545. Determination of Fineness of Powdered Coal, by W. A. Selvig and W. L. Parker. 1923. 14 pp., 1 fig. Summarizes results achieved by 12 cooperating laboratories in standardizing machine sieving.
- †RI 2546. Mine Timber in Pennsylvania Coal Mines, by H. E. Tufft. 1923. 3 pp. Mentions types of hardwood used for props, ties, and mine rails and gives average cost of timber.
- †RI 2547. A Floating Roof for Oil Tanks, by Ludwig Schmidt. 1923. 9 pp., 4 figs. Describes and gives sketches of construction of floating roof; adds that its primary function is to reduce evaporation losses by eliminating vapor space above stored oil.

Reports of Investigations

- †RI 2548. Solubility of Finely Divided Rock Dusts in Water, Kerosine, and Alcohol, by W. M. Myers. 1923. 6 pp. Discusses tests of liquids to be used as collecting mediums for dust samples.
- †RI 2550. The Paraffin Problem in Oil Wells, by R. van A. Mills. 1923. 11 pp. Treats causes of paraffining and suggests preventive measures and methods of removal of paraffin from wells.
- †RI 2551. Distribution of Air in Metal-Mine Ventilation, with Especial Reference to Flexible-Tubing Methods, by D. Harrington. 1923. 11 pp. Considers advantages and disadvantages of methods used to distribute air in metal mines and stresses necessity for adequate ventilation, particularly of "blind end."
- †RI 2553. Gaseous Content of Ground Waters as an Aid to the Petroleum and Natural-Gas Prospector, by G. W. Jones, W. P. Yant, and E. P. Burton. 1923. 15 pp., 1 fig. States that hydrocarbons present in water serve to indicate whether oil or gas sands exist in region through which waters have passed.
- †RI 2554. Cooling of Mine Air, by T. T. Read and F. C. Houghten. 1923. 19 pp. Describes beneficial effects to be obtained by circulating large enough volume of air.
- †RI 2555. Oxygen-Oil Explosions, by S. H. Brooks. 1923. 4 pp., 2 figs. Presents part 3 of investigation and covers spontaneous ignition of oils in oxygen under pressure. (See also RI 2507 and 2521.)
- †RI 2556. Ferric Sulfate and Sulfuric Acid from Sulfur Dioxide and Air, by E. S. Leaver and R. V. Thurston. 1923. 5 pp., 2 figs. Discusses process for preparing solutions utilizable in treatment of all oxidized copper minerals and in recovery of copper from concentrator tailings.
- †RI 2557. Industrial Accidents in the California Oil Fields, by H. C. Miller. 1923. 22 pp. Tabulates accidents by causes and occupations.
- †RI 2558. Methods of Testing Detonators, by C. A. Taylor and C. E. Munroe. 1923. 14 pp. Emphasizes value of sand test for estimating strength and efficiency of industrial detonators and for fixing standards by which different types of detonators may be judged.
- †RI 2560. The Effect of Silica in Iron Ore on Cost of Pig-Iron Production, by T. T. Read, T. L. Joseph, and P. H. Royster. 1924. 10 pp., 2 figs. Presents data showing relation between volume of slag and weight of coke needed per ton of iron.
- †RI 2563. Effective Temperatures for Still-Air Conditions and Their Application to Mining, by F. C. Houghten, C. P. Yaglaglou, and R. R. Sayers. 1924. 10 pp., 3 figs. States that comfort of workers depends solely upon effective temperature, that at 32° the effective temperature line coincides with dry-bulb temperature line, that at about 132° the effective temperature coincides with the wet-bulb temperature, and that below 32° the effect of humidity is reversed.
- †RI 2564. Conductivity and Specific Heat of Refractories at High Temperatures, by M. D. Hersey and E. W. Butzler. 1924. 7 pp. Assembles results of investigations on thermal conductivity and specific heat at high temperatures.
- †RI 2565. The Katathermometer—Its Value and Defects, by W. J. McConnell and C. P. Yaglaglou. 1924. 12 pp., 3 figs. Describes instrument and its use, especially as an index of human comfort. Includes bibliography.
- †RI 2566. Third Mine Rescue Maneuvers at Globe, Ariz., by F. C. Gregory. 1924. 4 pp., 1 fig. Discusses method of training and testing men.
- †RI 2567. The Danger of Open Lamps in Coal Mines, by L. O. Hsley and M. W. von Bernewitz. 1924. 3 pp. Stresses dangers and urges rigid inspection to prevent uses of open lights in gassy atmosphere.
- †RI 2569. Lignite Carbonization, by W. W. Odell. 1924. 6 pp. Estimates cost of char made from lignite of various costs.
- †RI 2570. A Float-and-Sink Method and Apparatus for Testing Coarse-Size Coal, by Earl R. McMillan and B. M. Bird. 1924. 12 pp., 2 figs. Describes method and its application.
- †RI 2571. Ash in Anthracite, by O. P. Hood. 1924. 2 pp. Gives average ash content of 127 samples, grouped by size.
- †RI 2572. Carbon Monoxide Fatalities from Natural-Gas Heaters Investigated by the Bureau of Mines in the Pittsburgh District During the Past Year, by G. W. Jones and W. P. Yant. 1924. 4 pp. Studies circumstances attending 10 fatalities.
- †RI 2574. Underground Signaling for Mines by the Ground-Conduction or "T. P. S." Method, by J. J. Jakosky. 1924. 11 pp., 6 figs. Concludes that underground communication can only be established through the earth at a distance of two to four times the distance between ground terminals and that it does not solve underground communication problem, because telegraphic code must be used.
- †RI 2575. Tests of Lignite Char as Reduction Fuel in the Smelting of Zinc Ores, by R. M. O'Harra. 1924. 7 pp. Considers value of lignite char as reduction agent and gives extended tabulation of results obtained.
- †RI 2578. A Process for the Production of Sponge Iron, by C. E. Williams, E. P. Barrett, and B. M. Larsen. 1924. 5 pp., 1 fig. Describes process, gives costs, and mentions uses of sponge iron.
- †RI 2582. The Distribution of Sulfur in Crude Petroleum, by N. A. C. Smith and D. D. Stark. 1924. 17 pp., 3 figs. Describes a study of distribution of sulfur in products obtained from light Mexican crude.
- †RI 2583. The Hazards of Nonpermissible Explosives, by S. P. Howell and M. W. von Bernewitz. 1924. 5 pp. Summarizes accidents known to have been caused by nonpermissible explosives.
- †RI 2584. Some Effects on Man of High Temperatures, by W. J. McConnell and R. R. Sayers. 1924. 13 pp., 8 figs. Treats effects of high temperatures on respiration, weight, and blood concentration.
- †RI 2585. Mining Limestone for Lime Manufacture, by Oliver Bowles. 1924. 9 pp. Summarizes advantages of underground work (such as cleanness of product and avoidance of delays from bad weather) and its disadvantages (including increased cost of drilling and blasting and higher percentage of fines).
- †RI 2586. The Float-and-Sink Test for Fine Coal, by B. M. Bird and H. E. Messmore. 1924. 4 pp. Describes test and apparatus used.
- †RI 2587. New Uses of Nonmetallic Minerals, by W. M. Myers. 1924. 7 pp. Describes uses of andalusite, kyanite, sillimanite, beryl, spinel, and bentonite.
- †RI 2588. Fractional "Eduction" of Oil from Oil Shale, by Martin J. Gavin and Lewis C. Karrick. 1924. 9 pp., 3 figs. Concludes that there is no point in attempting to base commercial retort design on the disproved theory of fractional "eduction."
- †RI 2590. Development of Workmen's Compensation Insurance for Metal Mines, by Byron O. Pickard. 1924. 5 pp. Reviews origin of accident compensation, gives a digest of State compensation laws, and describes types of insurance carriers.
- †RI 2591. The Carbon Monoxide Self-Rescuer, by A. C. Fieldner, S. H. Katz, and D. A. Reynolds. 1924. 10 pp., 5 figs. Describes self-rescuer and its use and gives sketches.
- †RI 2593. Carbon Monoxide Poisoning in Homes and Industries, by R. R. Sayers. 1924. 8 pp. Lists sources of poisoning, describes symptoms, and outlines treatment.
- †RI 2594. Tests of a Commercial Solution Used to Reduce the Hazard of CO poisoning in Garages, by A. C. Fieldner and W. P. Yant. 1924. 4 pp. States

†Out of print.

- that tests show "compound" is useless in absorbing CO.
- †RI 2595. Properties of Typical Crude Oils from the Producing Fields of California, by A. J. Kraemer and H. M. Smith. 1924. 55 pp. Classifies crudes, gives properties, and includes detailed analyses of typical samples. (See also RI 2608, 2846, 3074, and 3362.)
- †RI 2596. The Production of Lime from Small Stone, by W. M. Myers. 1924. 9 pp. Presents advantages and disadvantages of various types of kilns when used for calcining small stone.
- †RI 2597. Present Tendencies in Electric Brass-Furnace Practice, by H. W. Gillett and E. L. Mack. 1924. 10 pp. States that two types of furnace, the rocking indirect-arc and the induction, are finding increasing favor. Includes bibliography.
- †RI 2599. Radio as a Method for Underground Communications in Mines, by J. J. Jakosky. 1924. 4 pp. Stresses three main points: (1) That in accounts of successful underground reception, the sending station was more powerful than could possibly be considered practical for underground transmission; (2) that no instances are on record of successful transmission from mine to surface; and (3) that in practically all tests metallic conductors are controlling factors.
- †RI 2602. Tests on the Leakage of Mine-Ventilating Doors, by J. W. Paul, G. E. McElroy, and H. P. Greenwald. 1924. 3 pp. Describes leakage tests and tabulates results.
- †RI 2603. Assay-Retort Studies of Ten Typical Oil Shales, by W. L. Finley, J. W. Horne, D. W. Gould, and A. D. Bauer. 1924. 9 pp., 7 figs. Presents results of study of shales from Colorado, Scotland, Utah, Kentucky, Brazil, Nevada, and Australia.
- †RI 2604. Combustibility of Coke and Rate of Combustion, by T. L. Joseph. 1924. 5 pp. Stresses need of distinguishing between combustibility and rate of combustion, defines each, and gives table showing weight rate and volume rate of combustion per tuyère.
- †RI 2606. Tentative Specifications for Rock Dusting to Prevent Coal-Dust Explosions in Mines, by G. S. Rice, J. W. Paul, and R. R. Sayers. 1924. 6 pp. Defines standard rock dust and states in detail what is meant by adequate rock dusting.
- †RI 2607. Premium Rates for Compensation Insurance for Underground Metal-Mine Workers, by Byron O. Pickard. 1924. 9 pp. Discusses factors that help to determine premium rates.
- †RI 2608. Properties of California Crude Oils. II. Additional Analyses, by A. J. Kraemer and H. M. Smith. 1924. 55 pp. (See also RI 2595, 2846, 3074, and 3362.)
- †RI 2609. Firing a Hand-Fired Down-Draft Furnace, by J. F. Barkley. 1924. 6 pp. Describes method used and results obtained in testing furnace to obtain best results with a minimum of smoke.
- †RI 2611. Fatalities in the California Oil Fields, by H. C. Miller. 1924. 4 pp. Lists fatalities in California oil-producing industry, in 1923, by causes.
- †RI 2612. Effects of Extraneous Gas on the Production of Oil Wells in the Lyons-Quinn Field of Oklahoma, by M. J. Kirwan. 1924. 21 pp., 6 figs. Gives results of survey of field to determine ultimate effect on production of using gas from lower sands to stimulate yield.
- †RI 2613. Microchemical Analyses and Its Application in the Determination of Low-Grade Ores, by E. E. Fairbanks. 1924. 6 pp., 1 fig. Shows advantages of microchemical methods in determining constituents of ores.
- †RI 2615. Sand-Blast Sand, by W. M. Weigel. 1924. 6 pp. Includes general information as to grades, shape of grains, and preparation.
- †RI 2616. Saving Gasoline and Increasing Mileage by Proper Carburetor Adjustment, by G. W. Jones and A. A. Straub. 1924. 9 pp., 1 fig. Describes results of tests of high-test and low-test gasoline and benzol-gasoline blend to determine effect on carburetor adjustment.
- †RI 2617. The Safety Bonus in Metal Mining, by F. C. Gregory. 1924. 3 pp. Presents four plans for earning safety bonus.
- †RI 2618. Hindered-Settling Classification in Relation to Table Concentration of Idaho Lead-Zinc Ores, by A. W. Fahrwald. 1924. 1 p., 1 fig. Describes in detail new method of hydraulic classification, sketches apparatus, and analyzes products of various types of classifiers.
- †RI 2619. The Effect of the Temperatures of Liquid-Oxygen Explosives on Cordeau Bickford, by D. B. Gawthrop. 1924. 5 pp., 1 fig. Concludes that Cordeau Bickford can be used with liquid-oxygen explosives in the same way as with other explosives, as low temperatures do not noticeably affect its rate of detonation, sensitiveness, or brittleness.
- †RI 2621. The Resistance of Coal-Mine Entries to the Flow of Air, by J. W. Paul, G. E. McElroy, and H. P. Greenwald. 1924. 3 pp. Considers resistance to flow of air in entries where there are no obstructions other than natural roughness of the ribs, roof, and floor. (See also RI 2647 and 2671.)
- †RI 2622. Filter Sand for Municipal Water Supply, by W. M. Weigel. 1924. 6 pp. Names requirements for filter sands, specifications, and sources. Includes bibliography.
- †RI 2624. Temperatures in Cabs of Freight Locomotives Passing Through Tunnels of the Chesapeake & Ohio Railway, by S. H. Katz and E. G. Meltzer. 1924. 8 pp., 6 figs. Investigates temperatures at various positions in cabs and in tunnels, and suggests ways of relieving discomfort.
- †RI 2625. The Cost of Accidents in Metal Mines as Measured by Compensation Insurance Premiums, by Byron O. Pickard. 1924. 9 pp. Mentions types of insurance and gives rates.
- †RI 2626. Hazards of Electric Sparks and Arcs in Coal Mines, by L. C. Hsley. 1924. 3 pp. Lists accidents from 1910 to 1924 attributed to electrical apparatus and circuits and causing 499 fatalities.
- †RI 2627. The Utilization of Dolomite for Refractories, by G. A. Bole. 1924. 11 pp. Concludes (1) that by using certain fluxes in proper proportions dolomite can be dead-burned to a grain that will not slake in air or under treatment in an autoclave; (2) that several satisfactory binders for ground grains are obtainable; (3) that satisfactory shapes can be made from ground sinter by semidry process and slop-mold method; and (4) that such brick have physical properties indicating that they will give good service.
- †RI 2630. Ash-Softening Temperatures and Clinkering of Coals in a Boiler Furnace, by J. F. Barkley. 1924. 12 pp. States after tests that there appears to be a general relationship between ash-softening temperatures and clinkering.
- †RI 2631. Determination of Gas Distribution in Internal-Combustion Engines by Gas Analysis, by G. W. Jones, W. P. Yant, and L. B. Berger. 1924. 6 pp., 4 figs. Shows results of tests to indicate how the relative distribution of fuel to different cylinders of an internal-combustion engine can be determined by gas analysis.
- †RI 2632. An Experimental Still for the Detailed Study of Crude Petroleum, by M. B. Cooke. 1924. 21 pp., 5 figs. Describes still and its operation and gives distillation data.
- †RI 2634. Magnetic Recovery of Combustible in Boiler-Plant Refuse, by Rudolf Kudlich. 1924. 2 pp. Describes briefly process used in Europe for reclaim-

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- ing combustible matter from boiler or furnace refuse.
- †RI 2637. Some Features of Ventilating Fans at 164 Coal and Metal Mines, by D. Harrington and M. W. von Bernewitz. 1924. 5 pp. Studies fan installations at 154 disasters and suggests that, though no definite rule can be given for procedure in time of disaster, the fan should be placed in running order and an attempt be made to keep main traveled roads ventilated.
- †RI 2638. The Critical Time of Day for Coal-Mine Explosions, by L. D. Tracy and M. W. von Bernewitz. 1924. 5 pp., 1 fig. Concludes from study of 256 explosions that there are two critical times of day when explosions are likely to occur—between 6 and 9 a. m. and between 3 and 7 p. m.
- †RI 2639. Improvement of the Geophone by the Use of Electrical Sound Amplifiers, by W. T. Ackley, Jr., and C. M. Ralph. 1924. 5 pp., 1 fig. Describes adaptation of vacuum-tube and audio-frequency amplifier to new form of geophone.
- †RI 2641. Mine Accident Statistics, by W. W. Adams. 1924. 51 pp. Considers lost-time accidents to underground workers, including data for causes, ages, occupations, nationalities, and States.
- †RI 2645. Revised List of Publications on Ceramic Investigations, Bureau of Mines, by L. E. Geyer. 1924. 7 pp. Revision of RI 2437. Lists titles and authors of Bureau publications on ceramics.
- †RI 2646. Special Sands, by W. M. Weigel. 1924. 9 pp. Includes data on filter sand, sand-blast sand, engine sand, abrasive sand, fire or furnace sand, roofing sand, and pottery-placing sand.
- †RI 2647. The Resistance of Coal-Mine Entries to the Flow of Air, by J. W. Paul, H. P. Greenwald, and G. E. McElroy. 1924. 3 pp. Comprises part 2 of study begun in RI 2621. Discusses resistance caused by mine cars. (See also RI 2671.)
- †RI 2648. Calcined Dolomite as a Substitute for Lime in the Recovery of Gold and Silver by the Cyanide Process, by E. S. Leaver, C. W. Davis, and J. A. Woolf. 1924. 7 pp. States that results of tests show that MgO content of calcined dolomite cannot be used advantageously to neutralize acidity in regular cyanide process where cyanide solution is to be used repeatedly to extract fresh batches of ore, although it may be substituted for lime in the cyanide treatment of certain ores.
- †RI 2649. Explosion Hazards Incidental to Unwatering Coal Mines, by L. D. Tracy. 1924. 5 pp. Issues warning against possibility of presence of gas accumulations in flooded mines, indicating the precaution of using approved closed lights when working in such an area.
- †RI 2651. Factors Retarding Transmission of Radio Signals Underground and Some Further Experiments and Conclusions, by J. J. Jakosky and D. H. Zellers. 1924. 10 pp., 2 figs. Points out limitations of pure radio and shows influence of earth strata in retarding pure radio signals.
- †RI 2652. Zinc Used for Roofing, by Chas. E. van Barneveld. 1924. 10 pp., 5 figs. Shows forms in which zinc is used for roofing, pictures ways of laying zinc roofing, and states advantages and disadvantages.
- †RI 2654. Effects of Temperature and Pressure on Gypsum and Anhydrite, by Marie Farnsworth. 1924. 3 pp. Describes tests of chemical and physical properties of anhydrite with regard to its wider utilization.
- †RI 2655. Analysis of Oil-Wax Mixtures, by L. D. Wyant and L. G. Marsh. 1924. 3 pp., 1 fig. Discusses equipment used, sampling methods, and test procedure.
- †RI 2656. The Production of Sponge Iron, by C. E. Williams, E. P. Barrett, and B. M. Larsen. 1924. 14 pp., 7 figs. Describes successful use of rotary kiln for large-scale continuous production of sponge iron.
- †RI 2658. Pollution by Oil of the Coast Waters of the United States, by F. W. Lane, C. P. Bowie, and J. S. Desmond. 1924. 14 pp. Considers pollution of coast waters from various sources—oil-burning ships and tankers—and its effect upon marine life, public health, and bathing beaches. Also tells of methods of oil disposal on board ship.
- †RI 2660. Health Hazards in the Mining Industry, by R. R. Sayers. 1924. 14 pp. States that principal health hazards in coal mines are due to abnormal conditions of air (presence of carbon monoxide, hydrogen sulfide, and siliceous dusts). Discusses sewage disposal and water supply.
- †RI 2661. Exhaust Gases from Engines Using Ethyl Gasoline, by R. R. Sayers, A. C. Fieldner, W. P. Yant, B. G. H. Thomas, and W. J. McConnell. 1924. 24 pp., 3 figs. Describes extensive tests to determine whether persons operating machines on ethyl gasoline were in danger of poisoning from the tetraethyl lead used in the fuel.
- †RI 2663. Friction Factors for Metal-Mine Airways, by G. E. McElroy and A. S. Richardson. 1925. 3 pp. Gives schedule of friction factors and tells how to apply them.
- †RI 2664. Hazards of Unsafe Types of Gas Masks, by S. H. Katz. 1925. 5 pp. Issues warning against using discarded military gas masks in industry.
- †RI 2668. A Test of CO₂ Recorders, by J. F. Barkley. 1925. 2 pp., 1 fig. Concludes that in general the CO₂ instruments on the market give accurate results when all elements are favorable.
- †RI 2669R. The Status of Research in Ore Dressing, by Ernest A. Hersam. 1925. 48 pp. (Revised.) Discusses ore-dressing processes in use in various centers of the United States, describes the mechanism of ore dressing, and also considers separation, classification, concentration, flotation, elutriation of clays and coal, dewatering, etc.
- †RI 2670. Possibilities in the Use of Helium-Oxygen Mixtures as a Mitigation of Caisson Disease, by R. R. Sayers, W. P. Yant, and J. H. Hildebrand. 1925. 17 pp., 1 fig. States that tests indicated that use of helium-oxygen mixtures as a substitute for air in diving work allows material reduction of time of decompression.
- †RI 2671. The Resistance of Coal-Mine Entries to the Flow of Air, by J. W. Paul, H. P. Greenwald, and G. E. McElroy. 1925. 4 pp. Comprises part 3 of series (see RI 2621 and 2647) and considers the resistance caused by timber sets and by cars in timbered entries.
- †RI 2674. The Ignition of Firedamp by Exposed Filaments of Electric Mine-Lamp Bulbs, by R. D. Leitch, A. B. Hooker, and W. P. Yant. 1925. 3 pp. Gives results of tests in methane and natural gas to show high percentage of ignition obtained in the former, which justify inclusion of safety device to protect lamp bulbs among specifications for permissible electric lamps.
- †RI 2677. Effect of Tank Colors on Evaporation Losses of Crude Oil, by Ludwig Schmidt. 1925. 7 pp., 4 figs. Describes tests of tanks painted black, red, gray, or aluminum and shows that light-colored paints are most effective in preventing evaporation losses from tanks containing gasoline or crude of high gasoline content.
- †RI 2678. Some Common Mistakes in Operating a Stoker-Fired Furnace, by J. F. Barkley. 1925. 5 pp. Points out common errors in stoking practice.
- †RI 2679. Methods of Laboratory Grinding of Coke for Analysis, by W. A. Selvig. 1925. 5 pp. Describes methods and concludes that grinding apparatus is likely to contaminate coke by introducing iron from abrasive action of coke on rubbing surfaces.

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- †RI 2682. Line Radio and the Effects of Metallic Conductors on Underground Communication, by J. J. Jakosky and D. H. Zellers. 1925. 10 pp., 7 figs. Discusses chief factors affecting carrier-current transmission, describes typical underground circuits for power and lighting, and sketches apparatus used, giving results obtained.
- †RI 2683. The Formation of Oil-Field Emulsions, by D. B. Dow. 1925. 9 pp. Explains formation of emulsions, tells of methods of removing them, and suggests preventive measures.
- †RI 2685. Bibliography on Economic Utilization of Mine Timber, by Harry E. Tufft and R. R. Hornor. 1925. 13 pp. Lists 182 references on various phases of subject.
- †RI 2686. A Convenient Method for Determining Gum-Forming Material in Gasoline, by M. B. Cooke. 1925. 4 pp., 1 fig. Describes method involving evaporation of sample in a steam-heated oven.
- †RI 2688. Methods Used for Dehydration of Oil-Field Emulsions, by D. B. Dow. 1925. 16 pp. Discusses in greater detail dehydration methods mentioned in RI 2683.
- †RI 2691. Recent Developments in the Production and Consumption of Abrasive Garnet, by W. M. Myers and C. O. Anderson. 1925. 11 pp. Treats chemical and physical properties of garnet, its occurrence, manufacture, and utilization.
- †RI 2692. The Physical Chemistry of Oil-Field Emulsions, by D. B. Dow and C. E. Reistle, Jr. 1925. 14 pp. Considers five important physical factors affecting recovery of gasoline from cut oil.
- †RI 2694. Present Trend in Flotation Flow Sheets and Classification of Flotation Feed, by A. W. Fahrenwald. 1925. 7 pp., 7 figs. Presents a number of flow sheets to illustrate various flotation practices.
- †RI 2697. Methods of Increasing Lump-Coal Production, with Especial Reference to Southern Illinois, by J. E. Tiffany and J. J. McKitterick. 1925. 7 pp., 7 figs. Offers a number of recommendations to operators desiring to increase production of lump coal.
- †RI 2698. Barium Polysulfide in Sulfidizing Oxidized Ores for Flotation, by E. S. Leaver and H. M. Lawrence. 1925. 4 pp. Tests possibilities of using barium polysulfide as sulfidizing reagent.
- †RI 2700. Present Status of Differential Flotation, by A. W. Fahrenwald. 1925. 12 pp. Describes apparatus and reagents used and cites typical examples of differential flotation.
- †RI 2704. Welfare and Safety in Connection with Mining in Utah, by A. L. Murray. 1925. 7 pp. Gives résumé of work being done by various mining companies.
- †RI 2705. Calcium Sulfate Retarders for Portland Cement, by E. E. Berger. 1925. 20 pp., 8 figs. Studies effect of different retarders on cement and presents results largely in form of curves. Includes bibliography.
- †RI 2708. Miscellaneous Analyses of Foreign Coals. 1925. 2 pp. Includes analyses of coals from China, Japan, New Zealand, and Australia.
- †RI 2709. Consumption of Reagents Used in Flotation, 1923-24, by Thomas Varley. 1925. 6 pp. Presents results of special canvass of mill operators. (See also RI 2203, 2777, 2852, 2931, 3004, and 3112.)
- †RI 2710. Gas Hazards in Street Manholes, by S. H. Katz, E. G. Meiter, and J. J. Bloomfield. 1925. 20 pp. Cites precautions for workers in manholes and gives first-aid directions for reviving gassed workers.
- †RI 2711. Falls of Roof and Coal in Bituminous-Coal Mines, by W. W. Adams. 1925. 10 pp., 3 figs. Summarizes data from reports of 1,372 individual accidents from falls of roof.
- †RI 2712. Temperature-Control System for Dressing and Tempering Fishtail Bits, by C. H. Shapiro. 1925. 18 pp., 3 figs. Presents data to show that a proper method of heating and quenching bits will increase footage more than 50 percent and reduce drilling time.
- †RI 2718. Diatomaceous Earth, by C. W. Davis. 1925. 14 pp., 1 fig. Describes properties, uses, occurrence, and production in Nevada. Includes bibliography.
- †RI 2719. Gas Masks for Protection in Air Against All Gases, Vapors, and Smokes, by A. C. Fieldner, S. H. Katz, H. W. Frevert, and E. G. Meiter. 1925. 10 pp., 2 figs. Discusses all-service gas mask, its construction and use.
- †RI 2721. Evaporation Losses of Gasoline in the Refinery, by Ludwig Schmidt. 1925. 16 pp., 4 figs. States that evaporation losses in refineries can be reduced by proper methods of refinery construction and operation. Also considers losses of gasoline in storage.
- †RI 2724. The Disposal of Petroleum Foots Oil, by L. G. Marsh and L. D. Wyant. 1926. 7 pp. Reports results of an investigation of the redistillation of foots oil.
- †RI 2725. Stream Pollution by Acid Mine Drainage, by R. D. Leitch. 1926. 7 pp. Concludes that neutralization of mine-drainage wastes is the only solution of the problem.
- †RI 2726. Coal-Mining Royalties and Leasing Conditions in Williamson and Franklin Counties, Ill. (District No. VI), by L. D. Tracy. 1926. 24 pp. Presents first of series of studies on subject to assist coal-mining industry to standardize forms of leases. (See also RI 2743 and 2780.)
- †RI 2727. Boiler-Water Conditioning, with Special Reference to High Operating Pressure and Corrosion, by R. E. Hall. 1926. 6 pp., 1 fig. Discusses scope of boiler-water conditioning, prevention of scale formation on evaporating surfaces, feed-water lines, and pre-heating sections, relation between chemical used in treatment and operating pressure, and prevention of corrosion on surfaces in contact with feed or boiler water.
- †RI 2730. Experiences with the Combustion of Fuel Oil in Power-Plant Boilers, by J. F. Barkley. 1926. 6 pp., 1 fig. Describes tests and gives representative analyses of products of combustion.
- †RI 2731. Analysis of Copper-Palladium-Gold-Silver Concentrates, by C. W. Davis. 1926. 5 pp. Describes five methods of analyzing Alaska ore containing 40 to 50 percent copper.
- †RI 2732. Solubility and Effects of Natural Gas and Air in Crude Oils, by D. B. Dow and L. P. Calkin. 1926. 13 pp., 5 figs. Includes data obtained in investigating the effect of pressure and temperature on the amounts of natural gas and air that can be held in solution in different crude and refined oils, as well as the effect on gravity and volume.
- †RI 2733. Compensation Insurance Rates as a Measurement of Accident Prevention in Mines, by Byron O. Pickard. 1926. 6 pp. Concludes that by expenditure of relatively small amount in statistical analyses causes of accidents can be determined and that a competent safety engineer can devise preventive measures for the larger portion of these accidents.
- †RI 2735. The Value of Leakage Tests on Natural-Gas Transmission Lines, by E. L. Rawlins. 1926. 9 pp. States that systematic leakage tests not only aid in conservation of gas but can be made to show direct financial returns.
- †RI 2739. Gases from Blasting in Heavy Sulfides, by E. D. Gardner, G. W. Jones, and J. D. Sullivan. 1926. 8 pp. Shows that large amounts of sulfur dioxide may be generated in blasting in heavy sulfides, as well as hydrogen sulfide.
- †RI 2743. Coal-Mining Royalties and Leasing Conditions in Vermillion and Edgar Counties, Ill. (District VIII), by L. D. Tracy. 1926. 27 pp. Continues survey begun in RI 2726. (See also RI 2780.)
- †RI 2744. Flotation of Limestone from Siliceous Gangue, by Oscar Lee. 1926. 3 pp. Points out value of lime flotation, because use is made of available lime for

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- fluxing gangue, and recovery of iron is increased and sintered concentrate rendered self-fluxing.
- †RI 2745. Tests and Characteristics of Dust Respirators, by S. H. Katz, G. W. Smith, and E. G. Meiter. 1926. 8 pp. Gives results of tests of 13 respirators and points out advantages and disadvantages.
- †RI 2746. Sanitary Survey of the Coal Mines of Alabama, by F. V. Meriwether. 1926. 20 pp. discusses water supply, sewage disposal, industrial waste, control of communicable diseases and food supplies, and housing conditions.
- †RI 2747. Study of the Reactions in an Iron Blast Furnace, by S. P. Kinney, P. H. Royster, and T. L. Joseph. 1926. 11 pp., 10 figs. Describes tests in Bureau of Mines 300-ton furnace at Minneapolis, Minn.
- †RI 2750. Gas Mask for Protection Against Ammonia Gas, by A. C. Fieldner, S. H. Katz, and H. W. Frevort. 1926. 3 pp. Describes construction and use of mask.
- †RI 2751. Nomographic Charts for Computing the Rate of Leakage from Natural-Gas Lines, by E. O. Bennett. 1926. 3 pp. Explains use of charts intended for ready reference when field tests are made.
- †RI 2752. Methods of Testing High-Pressure Natural-Gas Lines for Leakage Losses, by E. L. Rawlins. 1926. 10 pp., 3 figs. Discusses "pressure-drop" method, "metering-in and metering-out" method, and "metering-in" method.
- †RI 2755. The Sizing Action of a Coal-Washing Table, by B. M. Bird. 1926. 8 pp. Shows how coal-washing table separates according to size and to specific gravity.
- †RI 2757. Extinction of Methane Flames by Helium, by H. F. Coward and G. W. Jones. 1926. 5 pp., 1 fig. Describes tests showing that helium is more extinctive of methane flames than is argon.
- †RI 2758. Explosibility of Oil-Shale Dust, by V. C. Allison and A. D. Bauer. 1926. 8 pp., 1 fig. Concludes from tests in Experimental mine that oil-shale dusts tested were explosive, explosibility increasing with combustible content.
- †RI 2761. Magnetic Concentration of Flue Dust of the Birmingham District, by Oscar Lee, B. W. Gandrud, and F. D. DeVaney. 1926. 16 pp. Shows by tests that high content of gangue in average flue dust of Birmingham district makes it unfit to treat like flue dusts from other ores, from which a satisfactory product can be obtained by direct sintering.
- †RI 2762. Manufacture of Lime from Small Stone with a Sintering Machine, by W. M. Myers. 1926. 16 pp., 2 figs. Studies sintering machine as means of manufacturing lime from small stone and thus recovering a salable product from material often wasted.
- †RI 2766. Recent Progress in Slate Technology, by Oliver Bowles. 1926. 9 pp., 2 figs. Records changes in slate technology since publication of B 218.
- †RI 2769. Gas-Making and Fuel Problems of the Gas Industry of California, by Wm. W. Odell. 1926. 9 pp., 1 fig. Indicates possibilities of efficiently utilizing fuels in making gas by other than oil-gas process.
- †RI 2771. Fluctuations in the Temperature of Natural Gas Flowing in Buried and in Uncovered Pipe Lines, by E. L. Rawlins. 1926. 3 pp., 1 fig. Presents results of records kept for one year on temperature of natural gas flowing through pipe lines.
- †RI 2773. Accident-Severity Rates for Certain Metal Mines, by W. W. Adams. 1926. 3 pp. Compares accident-severity rates for metal mines, coal mines, and quarries and open-pit mines.
- †RI 2776. Hydrogen Sulfide Poisoning in the Texas Panhandle, Big Lake (Tex.) and McCamey (Tex.) Oil Fields, by W. P. Yant and H. C. Fowler. 1926. 20 pp., 3 figs. Describes findings of investigation of "poison gas" encountered during development of certain Texas oil fields. Suggests protective measures.
- †RI 2777. Consumption of Reagents Used in Flotation, 1925, by Thomas Varley. 1926. 10 pp. (See also RI 2203, 2709, 2852, 2931, 3004, and 3112.)
- †RI 2778. The Application of Compressed Air to the Elliott Pool, Nowata County, Okla., by B. E. Lindaly. 1926. 14 pp., 5 figs. Describes method used for artificially restoring rock pressure by air in Elliott pool.
- †RI 2779. Stream Measurement in Relation to Mine Drainage, by W. R. Crane and E. J. Maust. 1926. 5 pp., 2 figs. Tells of use of gaging rods and weirs to determine drainage from area overlying and adjacent to mines in Birmingham district, Alabama.
- †RI 2780. Coal-Mine Royalties and Leasing Conditions in Macoupin, Sangamon, and Montgomery Counties, District VII, Illinois, by L. D. Tracy. 1926. 48 pp. Continues study begun in RI 2726 and 2743.
- †RI 2781. What Is Known About the Effect of Smoke on Health, by W. C. White. 1926. 6 pp. Explains physiological effects of smoke.
- †RI 2783. Accident-Severity Rates for Certain Coal Mines, by W. W. Adams. 1926. 6 pp. Summarizes results of analysis of accident records of 59 coal mines for the calendar year 1925.
- †RI 2784. Future Timber Supply for Coal Mines; What One Company Is Doing, by L. D. Tracy. 1926. 5 pp. Shows how one company has adopted a systematic reforestation program and is growing its own trees from seedlings, largely conifers.
- †RI 2789. Charging Explosives in Drill Holes of Drift Rounds in Metal Mines, by E. D. Gardner. 1927. 15 pp. Discusses methods of loading individual holes of the rounds, giving results of tests in Arizona copper mine.
- †RI 2790. The Blasting of Hanging Ore Columns in Chutes and Drawing Raises, by E. D. Gardner. 1927. 6 pp. Concludes that all blasts in hanging chutes, ore passes, or drawing raises should be fired with electric detonators for safety and economy in using explosives.
- †RI 2793. Sources of Dust in Coal Mines, by J. J. Forbes and A. H. Emery. 1927. 17 pp., 7 figs. Determines by atmospheric sampling how much dust is raised into the air during various operations of coal mining, such as undercutting with machines, loading coal by hand, and transporting it from the working face to the surface.
- †RI 2794. Some Feldspathic Materials of the Pacific Northwest, by Hewitt Wilson. 1927. 13 pp. Describes characteristics, physical tests, and preparation of samples from deposits in Idaho, Oregon, Washington, and British Columbia.
- †RI 2798. The Use of Flocculating Reagents for the Recovery of Fine Mica, by W. M. Myers. 1927. 7 pp. Reviews general features of ground-mica industry and describes tests on flocculation of mica with electrolytes, including sulfuric acid, hydrochloric acid, potash alum, aluminum sulfate, and chrome alum.
- †RI 2801. Tests with Rock Dust for Extinguishing Fire, by H. C. Howarth and H. P. Greenwald. 1927. 5 pp. Shows that rock dust is effective in controlling fires when they may be approached closely enough for it to be applied direct; moreover, it has the advantages of not generating steam or evaporating.
- †RI 2802. Methods and Tools for Removing Paraffin from Flowing Wells, by C. E. Reistle, Jr. 1927. 4 pp., 1 fig. Describes construction and use of paraffin hook, paraffin knife, flow devil, and special equipment for use with these tools.
- †RI 2805. Known Accumulation of Gas Ignited by Unapproved Rock-Dusting Machine, by L. D. Tracy and C. W. Owings. 1927. 3 pp., 1 fig. Explains how non-permissible rock-dusting machine ignited gas which accumulated when machine damaged door so that it would not close and short-circuited the air.
- †RI 2806. The Interpretation of Crude-Oil Analyses, by N. A. C. Smith. 1927. 20 pp., 6 figs. Describes applica-

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- tion of Bureau of Mines Hempel method of interpreting analyses and classifying crudes.
- †RI 2807. Properties of Typical Crude Oils from the Producing Fields of Venezuela, by A. J. Kraemer. 1927. 7 pp. Supplements TP 346.
- †RI 2808. Analyses of Spindletop (Tex.) Crude Oils, by A. J. Kraemer and Peter Grandone. 1927. 5 pp. States that there are apparently three types of crude oil in the Spindletop field, although all belong to naphthene-base (wax-free) class.
- †RI 2811. The Flotation of Oxidized Ores, by Thomas Varley. 1927. 22 pp. Discusses sulfidizing agents, general properties of oxidized ores, and flotation plants treating oxidized ores.
- †RI 2812. Precipitation of Lead and Copper from Solution on Sponge Iron, by G. L. Oldright, H. E. Keyes, Virgil Miller, and W. A. Sloan. 1927. 4 pp. Describes experimental work on precipitation of lead and copper from leach solutions by use of sponge iron as precipitant.
- †RI 2813. The "Breathing" Action of Electrical Equipment, by L. C. Halsey. 1927. 3 pp., 2 figs. Describes breathing tests of a motor and the switch and fuse compartment used with the motor.
- †RI 2817. Desulfurizing Action of Manganese in Iron, by C. H. Herty, Jr., and J. M. Gaines, Jr. 1927. 8 pp., 3 figs. Discusses relation between temperature and solubility of product, effect of oxidation on desulfurization, and desulfurizing action of manganese in transfer ladle.
- †RI 2819. Apparatus for Vacuum Distillation of Lubricating and Heavy Petroleum Oils, by M. J. Gavin and A. L. Foster. 1927. 5 pp., 2 figs. Revised as RI 2996.
- RI 2820. The Wire Saw in Slate Quarrying; Preliminary Report, by Oliver Bowles. 1927. 10 pp., 6 figs. Tells results of tests under normal quarry conditions, which indicate that the wire saw will cut about twice as fast as the channeling machine at about two-fifths of the cost per square foot of surface obtained. (See also RI 2851 and 2918.)
- †RI 2822. The Use of Solvents for Dewaxing Paraffin-Base Crude Oil, by H. M. Smith. 1927. 4 pp., 1 fig. Notes use of secondary butyl alcohol, acetone, and isopropyl alcohol as solvents.
- †RI 2824. Analyses of Crude Oils from the Seminole District, Oklahoma, by A. J. Kraemer. 1927. 18 pp. Gives detailed analyses of 11 samples by Bureau of Mines Hempel method.
- †RI 2828. The Detection of Sulfur in Petroleum and Petroleum Distillates, by F. W. Lane and J. M. Devine. 1927. 7 pp. Describes sensitive new method for qualitative detection of sulfur.
- †RI 2829. Progress of Fuel Economy at Petroleum Refineries in the United States, by G. R. Hopkins. 1927. 3 pp. Concludes that fuel economy has resulted largely from policy of efficient use of existing apparatus rather than installation of new apparatus.
- †RI 2832. Comparison of Oils Derived from Coal and from Oil Shale, by J. W. Horne and A. D. Bauer. 1927. 34 pp., 1 fig. Presents results of investigation of yields and properties of oils produced from oil shale, lignite, and subbituminous coal, using the standard assay method for oil-shale testing developed by the Bureau of Mines.
- RI 2833. Some Methods of Producing Flowing Wells in the Salt Creek Field and Their Effect on Gas-Oil Ratios, by K. B. Nowels. 1927. 50 pp., 8 figs. Describes tests in which wells were produced through casing with flow controlled by gate valves or flow nipples, through plain tubing, through tubing with oil flow controlled, by stopcocking, by flow devices at bottom of tubing, and through tubing and packer.
- †RI 2834. Reduction of Breathing Losses from Vapor-tight Lease Tanks, by Ludwig Schmidt. 1927. 8 pp.
- Concludes that most effective way of reducing breathing losses is through a combination of light-colored paints and the holding of suitable pressures on the tanks.
- RI 2837. The Study of an Intermediate-Base Crude Oil, by H. M. Smith. 1927. 9 pp., 2 figs. Consists of two parts—separation of crude into three main fractions and detailed study of less-volatile liquid fractions.
- †RI 2838. Safety Measures Save Lives in Colorado Explosion, by E. H. Denny. 1927. 6 pp. Tells of safety features adopted at Colorado coal mines.
- †RI 2839. Development of Some Fundamentals in the Ferric Sulfate-Sulfuric Acid Process, by Frank S. Wartman and Harmon E. Keyes. 1927. 11 pp. Discusses such factors as size of bubble that gives most efficient aeration, temperature of iron sulfate solution during aeration, proportion of sulfur dioxide to oxygen in roaster gas, etc.
- †RI 2840. The Carburetion of Combustible Gas with Butane and Propane-Butane Mixtures, with Particular Reference to the Carburetion of Water Gas, by Wm. W. Odell. 1927. 12 pp., 2 figs. Studies properties of low-boiling members of paraffin series and of gases of various heating values with water gas as a base and considers effect of replacing gas oil with propane, butane, or mixtures of the two.
- RI 2843. The Sulfur Content of Commercial Motor Fuels, by A. J. Kraemer, E. C. Lane, and C. S. Luce. 1927. 8 pp. Gives results of tests of samples collected by the Bureau of Mines in July 1927, and concludes that sulfur content of most commercial gasoline is less than 0.10 percent.
- †RI 2846. Properties of California Crude Oils; III, Additional Analyses, by A. J. Kraemer. 1927. 27 pp. (See also RI 2595, 2608, 3074, and 3362.)
- †RI 2847. Prevention of Hydrogen Sulfide Poisoning in Handling and Refining High-Sulfur Petroleum, by H. C. Fowler. 1927. 27 pp. Discusses the occurrence, physiological effects, and dangers of hydrogen sulfide, frequently a serious health and safety problem in petroleum industry; describes method for detecting gas and outlines safety measures.
- †RI 2848. Accident-Severity Rates for Certain Mines and Quarries, by W. W. Adams. 1927. 14 pp. Analyzes and tabulates data submitted in National Safety Competition for "Sentinels of Safety" trophy.
- RI 2849. Analyses of Crude Oils from the West Texas District, by A. J. Kraemer, Peter Grandone, and C. S. Luce. 1927. 18 pp. Gives brief production histories of various fields in the district and detailed analyses of oil samples.
- †RI 2850. Stocks of Petroleum Products Held by Exporters, by G. R. Hopkins. 1927. 11 pp. Includes statistical analysis of petroleum stocks during 1927 and of exports for 1925-26, with alphabetical list of exporting companies.
- †RI 2851. The Wire Saw in Slate Quarrying; Supplementary Report, by J. R. Thoenen. 1928. 8 pp. Shows results of successful tests in Pennsylvania quarries of novel device introduced from Europe. (See also RI 2820 and 2918.)
- †RI 2852. Consumption of Reagents Used in Flotation, 1926, by Thomas Varley. 1928. 4 pp. Presents annual statistical summary, with explanatory comment, covering a wide variety of chemicals and oils used in the flotation process in metallurgical plants of the United States. (See also RI 2203, 2709, 2777, 2931, 3004, and 3112.)
- †RI 2853. The Resistance of Coal-Mine Entries to the Flow of Air, by H. P. Greenwald and G. E. McElroy. 1928. 4 pp. Deals with fourth phase of extensive investigation of coal-mine ventilation factors, referring especially to the resistance caused by right-angle bends.
- †RI 2855. Chambering Cut Holes of Drift Rounds in a Western Metal Mine, by E. D. Gardner. 1928. 4 pp.

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1 fig. Describes tests to show that chambering cut holes of drift rounds in silicified and chalcocenic quartz made possible decided reduction in cost per foot of drift and increased rate of advance of headings.

- †RI 2856. Status of Rock Dusting in the United States, by D. Harrington, J. J. Forbes, and F. Feehan. 1928. 8 pp. Shows that use of rock dusting is increasing, but that present record is not impressive or even satisfactory in view of large number of bituminous mines in operation.
- †RI 2857. Comparison of Ground Temperatures at Different Depths and Temperature Fluctuations of the Atmosphere, by E. L. Rawlins and T. W. Johnson. 1928. 3 pp., 2 figs. Gives results of tests to obtain information as to proper depth for burying natural-gas pipe lines to minimize temperature fluctuations and thus prevent excessive leakage of gas due to expansion and contraction of the pipe joints.
- †RI 2858. Tests of Atmospheres in Chesapeake & Ohio Railway Tunnels Between Clifton Forge, Va., and Hinton, W. Va., by R. R. Sayers, L. B. Berger, and W. P. Yant. 1928. 19 pp., 1 fig. Reports results of several tests made to determine temperature, humidity, and composition of tunnel atmospheres and their physiological effects on enginemen.
- †RI 2859. Portable Electric Cap Lamps in Alabama, by F. E. Cash. 1928. 13 pp. Reviews progress made in Alabama in introduction of permissible portable electric cap lamps. Gives list of lamps used, with description and suggestions on use and maintenance.
- †RI 2860. Flotation of Low-Grade Phosphate Ores, by H. M. Lawrence and F. D. DeVaney. 1928. 4 pp. Presents results so far attained in use of flotation to obtain higher recoveries of phosphate rock than are now being achieved in Florida district.
- †RI 2862. A Rapid Corrosion Test for Gasoline, by H. P. Rue. 1928. 5 pp. Describes mercury corrosion test which offers possibilities in the proper control of gasoline-treating plants.
- †RI 2863. Explosibility of Sulfide Dusts in Metal Mines, by E. D. Gardner and Edmund Stein. 1928. 11 pp. Points out that massive sulfides in metal mines are flammable and furnish fuel for many mine fires.
- †RI 2865. Rock-Strata Gases in the Cripple Creek District and Their Effect on Mining, by E. H. Denny, K. L. Marshall, and A. C. Fieldner. 1928. 24 pp. States that Bureau of Mines tests show that the Cripple Creek gases are of combined atmospheric and rock origin and are essentially air-depleted of a certain amount of oxygen and contain irrespirable carbon dioxide.
- †RI 2866. A Comparison of the Results Obtained with the Oxygen Bomb and Carius Methods in Determining Sulfur in the Heavier Petroleum Oils, by J. M. Devine and F. W. Lane. 1928. 3 pp. Concludes that for routine work and often for research the oxygen-bomb method of determining sulfur is entirely adequate, the more tedious Carius method being necessary only when results of highest accuracy are essential.
- †RI 2867. Titanium in Bauxite Ores and Sludges, by W. H. Coghill. 1928. 4 pp. Studies possibility of recovering titanium from lixiviated bauxite ores, and comes to conclusion that much of it is too disseminated for concentration.
- RI 2868. Insulated Mine-Car Couplings, by F. E. Cash and C. W. Owings. 1928. 3 pp., 4 figs. Describes construction of four insulated couplings, with sketches to illustrate report.
- †RI 2869. The Production of High-Alumina Slags in the Blast Furnace for the Manufacture of Alumina Cement, by T. L. Joseph. 1928. 7 pp., 2 figs. Discusses value and composition of alumina cements and describes tests in a 6-ton blast furnace.

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- †RI 2870. The Occurrence of Jarosite Minerals in Oxidized Lead Ores as a Factor in Metal Losses, by R. E. Head and Virgil Miller. 1928. 13 pp. Emphasizes the importance of recognizing the occurrence of jarosite minerals in the oxidized ores of lead and silver, and suggests modified methods to prevent losses in the treatment of these ores.
- †RI 2871. Flue Dusts from Copper Smelters of the Southwest; Composition and Methods of Treatment, by William A. Sloan. 1928. 40 pp. Discusses the feasibility of substituting hydrometallurgical processes in the treatment of flue dusts for the present method of returning the dusts to the furnaces for re-treatment.
- †RI 2872. The Use of Brattice Cloth in Coal Mines, by G. S. Rice and C. W. Owings. 1928. 8 pp. Presents data on materials employed, cost, use, treatment, and deterioration.
- †RI 2873. Notes on Extraction and Recovery of Radium, Vanadium, and Uranium from Carnotite, by H. A. Doerner. 1928. 12 pp. Presents details of a modified nitric acid method that gives high extraction of radium and vanadium from a variety of ores and is more economical than the original method advocated by the Bureau.
- †RI 2874. Milling Baboquivari Ores, by Edmund S. Leaver and Jesse A. Woolf. 1928. 2 pp. Outlines a method for cyanide extraction of silver and gold from ores in Baboquivari mining district, Arizona.
- †RI 2875. Accident-Severity Rates for Certain Mines and Quarries in 1927, by W. W. Adams. 1928. 14 pp. Analyzes and tabulates data submitted in National Safety Competition, 1927, for "Sentinels of Safety" trophy.
- †RI 2876. Use of the Acetylene Tetrachloride Method of Porosity Determination in Petroleum Engineering Field Studies, by Chase E. Sutton. 1928. 10 pp., 1 fig. Describes method and tabulates results of tests.
- †RI 2877. Flotation of Fluorspar Ores for Acid Spar, by W. H. Coghill and O. W. Greeman. 1928. 3 pp. Stresses importances of converting some of the gravel spar that glutts the market into acid spar and gives results of one of the flotation runs.
- †RI 2878. Copper-Milling Research in Michigan, by A. W. Fahrwald. 1928. 5 pp. Considers treatment of amygdaloid copper and states advantages of the flotation over the all-gravity process. Tabulates screen analyses of typical table feeds.
- †RI 2880. Crushing and Grinding Studies of Quartz, by John Gross and S. R. Zimmerley. 1928. 10 pp., 2 figs. Discusses dissolution method of surface measurement and tabulates results of tests.
- †RI 2881. Review of Fatalities in the California Petroleum Industry During the Calendar Year 1927, by G. B. Shea. 1928. 20 pp. Summarizes fatalities in petroleum operation by groups and suggests measures to prevent accidents.
- RI 2882. Shaft Fires—Magma Mine, by E. D. Gardner and D. J. Parker. 1928. 8 pp. Lists recommendations for preventing shaft fires.
- †RI 2883. The Re-Treatment of Comstock Tailings, by E. S. Leaver and J. A. Woolf. 1928. 7 pp. Tabulates results of tests.
- †RI 2884. Desirable Characteristics of Coke: Chemical, by J. D. Davis. 1928. 8 pp. Discusses fuel value and impurities of coke without attempting to fix close limits of chemical composition.
- †RI 2885. Standardizing the Open Flow from Natural-Gas Wells, by R. R. Brandenthaler, E. L. Rawlins, and T. W. Johnson. 1929. 6 pp., 3 figs. Describes tests performed in the Chickasha field. Recommends that this method be used until a practical field method can be developed.
- †RI 2886. Notable Increase in Fuel Economy Recorded at Petroleum Refineries in 1927, by G. R. Hopkins. 1928. 3 pp. States that the credit for the success attending fuel economy in 1927 may be attributed to

- the pipe still. Tabulates fuel used at refineries in the United States, 1926-27.
- †RI 2888. Utilization and Prevention of Molybdenum Waste in Oxidized Lead Ore Treatment, by R. E. Head and Virgil Miller. 1928. 3 pp. Gives results of tests made on a 100-gram sample of wulfenite ore from the Star district near Milford which had for their object the separation and recovery of the lead and molybdenum in separate products.
- †RI 2889. Observations on Acid Mine Drainage in Western Pennsylvania, by R. D. Leitch. 1928. 18 pp., 2 figs. Discusses some of the factors contributing to formation of acid mine waters, the yearly variations in quantity and quality of drainage, and effect of mining methods; gives some attention to economic phases.
- †RI 2890. Determining the Air-Flow Resistance of a Small Shaft Mine by Natural Draft, by G. E. McElroy and A. S. Richardson. 1928. 15 pp., 2 figs. Presents data on the rate of air-temperature changes in the mine openings under low-velocity flow conditions, on the determination of natural draft pressures by direct observation of pressure differences on stoppings, and on the correlation of calculated resistance factors for mines with factors determined from natural draft experiments. Shows the difference between single-lever and multilever ventilation effected by natural draft.
- †RI 2892. A Visible-Action Continuous-Distillation Apparatus for Laboratory Study of Fractionation, by R. H. Espach. 1928. 7 pp., 9 figs. Describes apparatus and tests. Gives distillation curves.
- RI 2893. Volumetric and A. P. I. Gravity Changes Due to the Solution of Gas in Crude Oils, by R. van A. Mills and R. E. Heithecker. 1928. 15 pp., 5 figs. Includes data obtained during the determination of volume and gravity correction factors to be applied in the oil-recovery investigations of the Bureau of Mines.
- †RI 2894. The Relations Between Specific Volume, Voids, and Size Composition in Systems of Broken Solids of Mixed Sizes, by C. C. Furnas. 1928. 10 pp., 9 figs. Outlines a method whereby the composition of maximum density for systems of broken solids of mixed sizes may be accurately predicted.
- †RI 2895. A Comparison of the Acidity of Waters from Some Active and Abandoned Coal Mines, by R. D. Leitch and W. P. Yant. 1928. 8 pp. Concludes that the acidity of waters from abandoned and sealed mines is lower than that from active mines.
- †RI 2896. The Production of Magnesia and Silica Crucibles in the Induction Furnace, by C. N. Schuette. 1928. 6 pp., 2 figs. Describes equipment and method that produced crucibles of greater wall thickness than could be readily fabricated from commercial fused silica and for heavy-walled magnesia crucibles.
- †RI 2897. Methods of Preparing and Cleaning Some Common Heavy Liquids Used in Ore Testing, by R. G. O'Meara and J. B. Clemmer. 1928. 6 pp. Outlines methods for the preparation and care of some of the more common heavy liquids.
- †RI 2898. Ferrous Oxide from Iron and Magnetite, by C. T. Anderson. 1928. 7 pp., 2 figs. Discusses results of repeated interaction between partly reduced magnetite and iron, and the calculations which may be made from such results.
- †RI 2899. Determination of Flakiness of Ores, by W. H. Coghil, O. W. Holmes, and A. B. Campbell. 1928. 7 pp. Outlines a positive and mechanical method for determining the flakiness of ores and similar investigations.
- RI 2901. The Reaction Between Magnetite and Ferrous Sulfide, by F. S. Wartman and G. L. Oldright. 1928. 14 pp., 7 figs. Gives results of studies to explain apparent inconsistencies, to determine more exactly the rate of reaction of magnetite with ferrous sulfide under the conditions obtaining in copper-smelting furnaces, and to ascertain the nature of the resulting products. (See also RI 3072.)
- RI 2902. Preliminary Ore-Dressing Tests to Recover Manganese in Rhodochrosite Ores, by F. D. DeVaney and W. H. Coghill. 1928. 4 pp. Tabulates results of tests of rhodochrosite obtained at Butte, Mont.
- †RI 2903. Commercial Possibilities in the Use of Synthetic Hydrocarbon Processes in the Gas Industry, by W. W. Odell. 1928. 15 pp., 5 figs. Discusses the practicability of employing synthetic processes as a part of the gas-making scheme in a city gas plant.
- †RI 2904. The Flow of Gases Through Beds of Broken Solids, by C. C. Furnas. 1928. 20 pp., 22 figs. A brief summary of experimental work done at the North Central Experiment Station with the object of formulating a more or less complete quantitative theory of the workings of the iron blast furnace.
- †RI 2905. The Explosibility of Suspensions of Soap Dust in Air, by David F. Smith and F. A. Hartgen. 1928. 3 pp. Suggests preventive measures and urges importance of humidifying the atmosphere or providing metallic conduction in order to ground static charges.
- †RI 2906. Preliminary Examination of Low-Grade Bauxite with Particular Reference to Flotation, by B. W. Gandrud and F. D. DeVaney. 1928. 8 pp. Tabulates results of flotation tests to determine the possibility of removing excessive quantities of silica and iron.
- †RI 2908. Carbon Monoxide from Automobiles Using Ethyl Gasoline, by W. P. Yant and L. B. Berger. 1929. 8 pp. Describes equipment and tabulates results of test.
- †RI 2909. A Preliminary Investigation of Rubber-Sheathed Concentric-Type Trailing Cables for Mining Machines, by L. C. Ilsley and A. B. Hooker. 1929. 11 pp. Points out 16 different factors that are apparent in the physical make-up of cables and tells how they affect the behavior of the cables in one or more of the tests.
- †RI 2910. Potash from New Jersey Greensand, Preliminary Report, by J. R. Thoenen. 1929. 54 pp. Concludes that at present no large-scale successful process is in operation for the extraction of potash from New Jersey greensands and that foreign potash fertilizer products can be distributed at seaboard and in interior points at lower freight rates than similar products from New Jersey. Recommends further laboratory study of extraction processes.
- †RI 2911. Study of Quarry Costs, by J. R. Thoenen. 1929. 12 pp. Tabulates compilations of quarry costs. Solicits suggestions from quarry operators as to alterations or additional groupings so that the final report will present the greatest possible amount of information.
- †RI 2912. The 1, 3 Dimethyl-2-Phenoxyacetic Acid, by R. L. Brown and B. F. Branting. 1929. 2 pp. Tells how the hydroxyacetic acid derivative of 1, 3 dimethyl-2-hydroxybenzene was prepared and notes properties. Tabulates the physical characteristics of the hydroxyacetic derivatives of 5 xylenols.
- †RI 2913. A Study of Gauze Heating in Miners' Flame Safety Lamps, by E. J. Gleim, A. B. Hooker, and P. G. Guest. 1929. 7 pp. Gives results of tests and urges importance of giving the utmost attention to every detail in the correct assembling and maintenance of flame safety lamps.
- †RI 2914. Control of a Small Mine Fire with Rock Dust, by H. C. Howarth and George McCaa. 1929. 3 pp. Describes in detail the method by which the fire was extinguished.
- †RI 2917. The Melting Point of Potassium Chromate, by David F. Smith and F. A. Hartgen. 1929. 3 pp. Gives results of test.

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- †RI 2918. The Wire Saw in Slate Quarrying, by Oliver Bowles. 1929. 7 pp., 1 fig. Describes the equipment in the quarry. Covers results attained during the summer of 1928. (See also RI 2820 and 2851.)
- †RI 2919. Laboratory and Field Tests of the Martienssen Permissible-Type Methane Detector, by A. B. Hooker, W. J. Fene, and R. D. Currie. 1929. 10 pp., 1 fig. Presents the results of tests and recommends that existing mining codes should be revised, where necessary, to allow the use of any permissible-type methane detector in testing for gassy atmospheres, except in special places or cases where it may be necessary to test for carbon dioxide.
- RI 2920. A New Permissible Blasting Device, by J. E. Tiffany. 1929. 8 pp., 2 figs. Describes device and method of conducting tests for permissibility.
- RI 2921. Coarse Sand Flotation, Classification, and Table Concentration, by A. W. Fahrenwald and Clarence Thom. 1929. 7 pp., 2 figs. Discusses a concentration process embodying flotation, classification, and tabling in the order named.
- RI 2923. Relative Ageing Properties of Gelatin Dynamites Containing Nitroglycerin and Ethylene Glycol Dinitrate, by A. B. Coates and G. St. J. Perrott. 1929. 7 pp., 1 fig. Discusses results of tests undertaken to determine the relative effects on rate of detonation, propulsive strength, and sensitiveness produced on low-freezing gelatin dynamite containing ethylene glycol dinitrate and regular dynamites containing nitroglycerin by long periods of storage.
- †RI 2924. Batch Classification in the Laboratory, by A. W. Fahrenwald and Clarence Thom. 1929. 5 pp., 1 fig. Describes and illustrates a batch laboratory classifier and elutriator and gives an application of the apparatus to grinding studies.
- †RI 2925. Losses of Phosphate in the Land-Pebble District of Florida, by H. M. Lawrence. 1929. 5 pp. Gives results of a study of the debris bank sands now accumulating in the land-pebble phosphate district of Florida.
- †RI 2926. The Reduction of Cuprous Oxide by Carbon Monoxide, by C. G. Maier. 1929. 7 pp. Deals with the calculation of gas concentrations in the reduction of the cuprous oxide which have a bearing on the bright annealing of copper.
- †RI 2927. A New Type of Laboratory Dust-Explosion Apparatus, by C. M. Bouton, C. H. Gilmour, and Garnet Phillips. 1929. 10 pp., 4 figs. Describes apparatus developed by the Bureau of Mines for use in studying explosibility of industrial dusts, particularly coal dusts.
- †RI 2929. The Study of a Fundamental Basis for Controlling and Gaging Natural-Gas Wells. Part 1. Computing the Pressure at the Sand in a Gas Well, by H. R. Pierce and E. L. Rawlins. 1929. 14 pp., 11 figs. Gives a series of charts and explains use. (See also M 7R and RI 2930.)
- †RI 2930. The Study of a Fundamental Basis for Controlling and Gaging Natural-Gas Wells. Part 2. A Fundamental Relation for Gaging Gas-Well Capacities, by H. R. Pierce and E. L. Rawlins. 1929. 21 pp., 4 figs. Presents results of the process to date on the problem of gaging gas-well capacities to deliver gas under different pressure conditions. (See also M 7R and RI 2929.)
- †RI 2931. Consumption of Reagents Used in Flotation, 1927, by A. M. Gaudin. 1929. 17 pp. Includes statistics regarding tonnage of ore treated by flotation and reagent consumption in treatment of various types of ores. (See also RI 2203, 2709, 2777, 2852, 3004, and 3112.)
- †RI 2932. A Staining Method for Distinguishing Cerussite and Anglesite in Ores, Concentrates, and Tailings, by R. E. Head and A. L. Crawford. 1929. 3 pp. Treats of a method for quickly identifying finely crushed minerals of the type named under a microscope.
- †RI 2933. Effect of Sieve Motion on Screening Efficiency, by A. W. Fahrenwald and S. W. Stockdale. 1929. 14 pp., 21 figs. Gives results of study of effect of vibration of sieve surface on passage of grains of ore through screens, and discusses relative effectiveness of various motions employed in screen operation.
- †RI 2934. Dissolution of Various Oxidized Copper Minerals, by John D. Sullivan. 1929. 9 pp. Gives data regarding time required to dissolve various copper minerals in ores in sulfuric acid and ferric sulfate solutions and consumption of reagents used in dissolving the minerals. Has bearing on recovery of copper by leaching methods from low-grade disseminated ore.
- †RI 2935. The Effect of Substituting Ethylene Glycol Dinitrate in Permissible Explosives, by G. St. J. Perrott and J. E. Tiffany. 1929. 5 pp. Gives results of tests to determine effect on safety and physical properties of permissible explosives of substituting ethylene glycol dinitrate for nitroglycerin or mixture of nitroglycerin and nitropolyglycerin.
- †RI 2936. Beneficiation of Oxidized Manganese Ores by Magnetic Separation of Roasted Jig Concentrates, by F. D. DeVaney and W. H. Coghill. 1929. 4 pp. Discusses method by which some of the ores too high in iron to make ferromanganese may be brought up to ferrograde.
- †RI 2937. Gravity Concentration of Alabama Oolitic Iron Ore, by F. D. DeVaney, B. W. Gandrud, and W. H. Coghill. 1929. 7 pp., 1 fig. Gives results of method for gravity concentration of ores of excessive silica content, of which the Birmingham district contains large reserves hitherto not amenable to successful treatment.
- †RI 2938. The National Safety Competition of 1928, by W. W. Adams. 1929. 17 pp. Gives names of winners and statistical details of an accident-prevention contest participated in by 284 mines and quarries.
- †RI 2939. Gas-Solid Contact in the Shaft of a 700-Ton Blast Furnace, by S. P. Kinney and O. C. Furnas. 1929. 10 pp., 8 figs. Outlines results of investigation of interior of shaft of a large iron blast furnace by giving data of actual size-distribution of solid particles in a typical furnace, and of efficiency contact between the gas and solid phases.
- RI 2940. A Method for Studying Factors Influencing the Rate of Burning or Pressure Development of Black Blasting Powder, by A. B. Coates and J. E. Crawshaw. 1929. 9 pp., 2 figs. Describes method and gives results of tests.
- †RI 2942. Flow of Natural Gas Through High-Pressure Transmission Lines, by T. W. Johnson and W. B. Berwald. 1929. 18 pp., 3 figs. Gives results of tests made on 25 operating pipe lines in Kansas, Oklahoma, Louisiana, Arkansas, Texas, and California; a table of the results obtained on 24 of the lines tested; and a discussion of representative tests and results.
- RI 2943. Tests of Bituminous Coking Coal in a Large Low-Pressure Heating Boiler, by P. Nicholls, C. E. Augustine, and B. A. Landry. 1929. 8 pp. Describes tests and tabulates results.
- †RI 2944. Accidents in Metal Mines Due to Falls of Men and Material, by F. D. Cannon. 1929. 9 pp. Revised as MC 41.
- RI 2945. The Disposal of Oil-Field Brines, by Ludwig Schmidt and J. M. Devine. 1929. 17 pp. Deals with the four general methods now used in the disposal of oil-field brines.
- †RI 2946. Some Operating Results on Small Heating-Plant Stokers, by J. F. Barkley. 1929. 2 pp., 3 figs. Gives results of tests.
- †RI 2948. Crushing Resistance of Minerals, by S. R. Zimmerley and John Gross. 1929. 4 pp. Gives results

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- of tests to determine crushing resistance of quartz, pyrite, sphalerite, calcite, and galena.
- RI 2949. The Relation of Table Feed Preparation to Table Efficiency, by A. W. Fahrenwald and W. F. Meckel. 1929. 15 pp., 23 figs. Outlines results of tests with quartz, silica, galena, magnetite beach sand, and siderite to determine relationship of specific gravity, size, and shape of table feeds to efficiency.
- RI 2950. The Role of Stratification in the Separation of Coal and Refuse on a Coal-Washing Table, by B. M. Bird and H. S. Davis. 1929. 19 pp. Demonstrates that stratification does not account for the separation effected by the coal-washing table and that cross-flowing water has an important selective action.
- †RI 2951. A Method for the Sizing of Ore by Elutriation, by John Gross, S. R. Zimmerley, and Alan Probert. 1929. 8 pp., 4 figs. Describes new method of elutriation for sizing material finer than 200-mesh to determine metallurgical recovery and surface in calculating of grinding efficiency.
- RI 2952. Efficiency of Grinding Mills, by John Gross and S. R. Zimmerley. 1929. 23 pp., 4 figs. Gives results of tests made with galena, sphalerite, and pyrite to develop a method whereby surface figures are obtained on a ground ore.
- †RI 2954. Smelting in the Lead Blast Furnace. I.—A Method for Approximating the Form of the Lead in Slag and Other Products of the Lead Blast Furnace, by G. L. Oldright and Virgil Miller. 1929. 8 pp. The first of a series intended to determine conditions within the lead blast furnace by direct experimentation. (See also RI 2957, 2963, 2965, 2966, 3088, 3094-3096, 3183, 3243-3246, and 3264.)
- RI 2955. Some Important Factors in Sponge-Iron Production, by E. P. Barrett. 1929. 4 pp. Discusses progression of sponge iron to steel, reduction of iron oxides, elimination of gangue, and absorption of sulfur.
- †RI 2956. Review of Fatalities in the California Petroleum Industry During the Calendar Year 1928, by G. B. Shea. 1929. 23 pp. Summarizes fatalities in petroleum operation by groups.
- †RI 2957. Smelting in the Lead Blast Furnace. II.—The Gases from the Top of the Lead Blast Furnace, by G. L. Oldright and Virgil Miller. 1929. 18 pp. The second paper of a series on smelting in the lead blast furnace. (See also RI 2954.)
- †RI 2960. Temperatures for Rapid Self-Heating of Powdered Coal and the Semicoke Made Therefrom, by F. A. Hartgen and David F. Smith. 1929. 5 pp., 18 figs. Discusses experimental results as shown in heating curves and curves of densities and chemical analyses of different screen sizes of powdered coal and semicoke.
- †RI 2961. A Preliminary Investigation of Rubber-Sheathed, Parallel Duplex-Type Cables for Mining Machines, by L. C. Ilsley and A. B. Hooker. 1929. 10 pp. Discusses test procedure and results, describing smash, stretch, tearing, bending, and splicing tests.
- RI 2963. Smelting the Lead Blast Furnace. III.—Rate of Descent of Stock Column and Formation of Accretions, by G. L. Oldright and Virgil Miller. 1929. 17 pp., 2 figs. The third of a series of papers on smelting in the lead blast furnace. Discusses measurements of rate of subsidence, location, composition, formation, and removal of accretions and conditions in crucible. (See also RI 2954.)
- †RI 2964. Survey of Fuel Consumption at Refineries in 1928, by G. R. Hopkins. 1929. 3 pp. Summarizes consumption of fuel oil, coal, natural gas, refinery gases, coke, and electricity as fuel at petroleum refineries in the United States, by regions.
- †RI 2965. Smelting in the Lead Blast Furnace. IV.—Composition and Temperature of the Gases at the Tuyère Zone, by G. L. Oldright and Virgil Miller. 1929. 27 pp., 7 figs. The fourth paper of a series on smelting in the lead blast furnace. Discusses sampling of gases at the tuyère zone, conditions necessary for reduction of metallic lead, effect of tapping, determination of temperature, and gas sampling. (See also RI 2954.)
- †RI 2966. Smelting in the Lead Blast Furnace. V.—Effect of Conditions at Various Tuyères on the Form of Lead and Composition of the Slag, by G. L. Oldright and Virgil Miller. 1929. 7 pp., 1 fig. The fifth of a series of reports on investigation to determine conditions within the lead blast furnace by direct experimentation. (See also RI 2954.)
- †RI 2967. The Dissolution of Cuprite in Sulfuric Acid and in Ferric Sulfate Solutions, by John D. Sullivan and G. L. Oldright. 1929. 9 pp., 3 figs. Second of a series of papers on the dissolution of copper minerals in various agents. Describes procedure and results of experimental work on the effect of particle size on rate of dissolution.
- †RI 2968. Xylenols and Higher Phenols That Have Been Found in Primary Tars, by E. J. Schneider and J. B. Shohan. 1929. 20 pp. Presents information obtained from a study of the literature concerning the properties of possible pure constituents of low-temperature tar.
- †RI 2969. The 1, 3-Dimethyl-5-Phenoxyacetic Acid and the 1, 2-Dimethyl-3-Phenoxyacetic Acid, by E. J. Schneider and J. B. Shohan. 1929. 10 pp. Report of further investigation of the constituents of low-temperature tar, describing the synthesis of two known xylenols and their hydroxyacetic acid derivatives.
- †RI 2970. Reaction of Metallic Iron and Copper Sulfate in the Flotation of Sphalerite, by F. D. DeVaney and C. W. Ambler, Jr. 1929. 9 pp. Describes flotation tests in which well-known reaction is applied to treatment of zinc ore.
- RI 2971. A System of Accounts for the Slate Industry, by Oliver Bowles. 1929. 25 pp., 1 fig. Study of accounting methods used by slate-quarry operators, presenting in detail a simple double-entry cost-accounting system.
- †RI 2973. Re-Forming Natural Gas in Water-Gas Generators, with Substantially Complete Elimination of Entrained Carbon, by Wm. W. Odell. 1929. 10 pp., 3 figs. Describes satisfactory method of re-forming natural gas into a product having virtually the same properties as other readily generated gases.
- †RI 2974. Abnormal Pressures in Explosion-Proof Compartments of Electrical Mining Machines, by E. J. Gleim. 1929. 6 pp. Describes conditions under which high pressures were encountered in mining machines and the means used to reduce the pressures.
- †RI 2975. Dynamites: Their Propulsive Strength, Rate of Detonation, and Poisonous Gases Evolved, by N. A. Tolch and G. St. J. Perrott. 1929. 16 pp., 5 figs. Presents results of ballistic-pendulum, Bichel-gage, and other tests of straight, ammonia, and gelatin dynamites, black blasting powder, and kieselguhr.
- †RI 2976. Permissible Explosives: A Study of Test Data, by G. St. J. Perrott and N. A. Tolch. 1929. 7 pp. Summarizes results of testing explosives for permissibility and shows effect of composition upon success or failure to pass tests.
- RI 2977. Rock-Dust Barriers for Coal Mines, by G. S. Rice, H. P. Greenwald, and H. C. Howarth. 1930. 14 pp., 5 figs. Explains purpose of barriers, limitations of use, and qualities of successful barriers. Describes three types of barriers selected for general use.
- †RI 2978. Flow of Gas in Blast-Furnace Shaft, by S. P. Kinney. 1929. 4 pp., 9 figs. Results of investigation

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- of a furnace operating on Lake Superior ores in the Chicago district.
- †RI 2979. Odor Intensity and Symptoms Produced by Commercial Propane, Butane, Pentane, Hexane, and Heptane Vapor, by F. A. Patty and W. P. Yant. 1929. 10 pp., 6 figs. Study of warning properties of fuel gas perceptible in advance of accumulations dangerous to health and safety. Advises addition of warning agent to fuel gas used in confined spaces.
- †RI 2980. Coke as a Domestic Heating Fuel, by P. Nicholls and B. A. Landry. 1929. 18 pp., 11 figs. Discusses composition, quality, and favorable characteristics. Gives instructions for burning coke and describes investigations carried out in domestic furnaces.
- †RI 2981. Leaching Silver in Unroasted Tailings with Ferric Salts in Saturated Brine, by G. L. Oldright. 1929. 4 pp. Outlines the history of brine leaching and describes leaching tests of ore from Park City, Utah.
- †RI 2982. Method for Comparison of the Size of Materials Used in Blast-Furnace Burdens, by S. P. Kinney. 1930. 4 pp. Briefly describes method employing screen analysis for measuring the average size of particle in a mass of finely ground material.
- †RI 2983. Ore Size and Blast-Furnace Economy, by S. P. Kinney. 1930. 4 pp., 3 figs. Points out the beneficial effect of gas-solid contact of decreasing over-all size of ore charged in layers of coarse and of fine material.
- †RI 2984. A Diaphragm or "Breather" Roof for Oil-Storage Tanks, by Ludwig Schmidt. 1930. 9 pp., 7 figs. Describes design and operation of a new type of tank roof which practically eliminates the movement of air-vapor mixtures from an oil-storage tank and is of especial value on tanks storing oil over long periods.
- †RI 2985. The Form of Copper in Converter Slag, by F. S. Wartman and W. T. Boyer. 1930. 16 pp., 1 fig. Authors conclude that use of the flotation process to clean slowly cooled slag produced from converting low- or medium-grade matte is technically practicable.
- †RI 2986. Experience with Electrical and Other Means of Firing Shots of Explosives in the Anthracite Region of Pennsylvania, by S. P. Howell. 1930. 13 pp. Records fatalities and other accidents connected with shot firing in anthracite mines, citing individual instances as examples of careless practice.
- RI 2987. Sensitization of Ammonium Nitrate by Nitrostarch, by G. St. J. Perrott, D. B. Gawthrop, and C. A. Taylor. 1930. 7 pp., 4 figs. Presents data showing that addition of nitrostarch increases sensitivity to explosion and completeness and speed of detonation.
- †RI 2989. Grinding and Classification. I.—Batch Grinding, by A. W. Fahrenwald. 1930. 9 pp., 4 figs. Describes batch-grinding technic designed for studying the rate of output of finished product in a ball mill.
- †RI 2990. Grinding and Classification. II.—Batch Closed-Circuit Grinding, by A. W. Fahrenwald. 1930. 11 pp., 5 figs. Laboratory closed-circuit technic to stimulate plant closed-circuit grinding practice is outlined; numerous experimental data are given.
- †RI 2991. Cracking Natural Gas in Water-Gas Generators with Recovery of Carbon Black, by Wm. W. Odell. 1930. 10 pp., 5 figs. Brief outline of the experimental cracking of natural gas in a water-gas generator at Louisville, Ky.
- RI 2993. Some Phases of the Relative Responsibility of Management and Workers for Accidents in Mines, by D. Harrington. 1930. 17 pp. Directs attention to careless practices of both officials and workers, to which many mine accidents are attributable.
- RI 2994. Effect of Sealing on Acidity of Mine Drainage, by R. D. Leitch, W. P. Yant, and R. R. Sayers. 1930. 11 pp. Discusses theory of acid formation in coal mines and describes effects of sealing eight mines in Indiana.
- †RI 2996. Apparatus for Vacuum Distillation of Lubricating and Heavy Petroleum Oils, by Martin J. Gavin and Arch L. Foster. 1930. 5 pp., 2 figs. A revision of RI 2819, issued in 1927. The present form of the vacuum-distillation apparatus, in which several changes have been made since 1927, is described.
- †RI 2997. Engineering Study of the Seminole Area, Seminole and Pottawatomie Counties, Okla., by R. R. Brandenthaler, W. S. Morris, and C. R. Bopp. 1930. 181 pp., 35 figs. An exhaustive study of an important oil-producing area, showing methods adopted to handle the peculiar conditions encountered.
- †RI 2998. Re-Treatment of Mother Lode Carbonaceous Slime Tails, by E. S. Leaver and J. A. Woolf. 1930. 6 pp. Presents summary of data to be printed in full later. Describes flotation methods and roasting and cyanidation of concentrates.
- †RI 2999. The Roasting of Chromite Ores to Produce Chromates, by H. A. Doerner. 1930. 30 pp. Gives results of a study of possibility of producing chrome from domestic deposits.
- †RI 3001. Nine Years of Smoke-Abatement Work at Salt Lake City, by Austin Gudmundsen. 1930. 17 pp., 5 figs. A history of the smoke-abatement campaign of 1919-20 conducted by the Bureau in cooperation with Salt Lake City and the University of Utah. Smoke from industrial plants has been reduced 90 percent, but residence smoke still constitutes a problem.
- †RI 3002. A Study of the Properties of Texas Polyhalite Pertaining to the Extraction of Potash, by H. H. Storch and Loyal Clarke. 1930. 19 pp., 4 figs. Outlines two possible industrial processes, one producing K_2SO_4 and $K_2SO_4 \cdot MgSO_4$, and the other producing K_2SO_4 only. (See also RI 3032, 3061, 3062, 3116, 3167, 3210, and 3237.)
- †RI 3003. Check Determinations of Fusibility of Coal Ash with the De Graaf Electrical Coal-Ash Fusion Furnace, by W. A. Selvig. 1930. 17 pp., 2 figs. Determines how closely different laboratories can check in calculating fusibility of coal ash, how well duplicate determinations by the same laboratory will check, and how the results with the De Graaf furnace compare with those of the standard gas-furnace method of the American Society for Testing Materials.
- †RI 3004. Flotation Reagents, 1928, by T. H. Miller and R. L. Kidd. 1930. 19 pp. Continues series of annual reviews on consumption of flotation reagents. (See also RI 2203, 2709, 2777, 2852, 2931, and 3112.)
- †RI 3005. Sulfur Dioxide in the Air at the Pittsburgh Experiment Station of the United States Bureau of Mines, by E. G. Meiter and C. E. Traubert. 1930. 5 pp. Discusses tests made to obtain data for use in interpreting screen-corrosion experiments, conducted simultaneously by the Bureau and the committee on screen-wire cloth of the American Society for Testing Materials.
- †RI 3006. The Power Consumed by Rotating Disks and Other Shaped Objects in Fluid Mediums, by A. W. Fahrenwald and W. W. Staley. 1930. 7 pp., 23 figs. Presents data obtained in an investigation to determine the effect of certain physical properties of the pulp upon power required to operate certain forms of pulp agitators. Two sets of experiments are given.
- †RI 3007. Use of Ethyl Mercaptan to Detect Leaks in Natural-Gas Distribution Systems, by R. R. Sayers, A. C. Fieldner, W. P. Yant, R. D. Leitch, and S. J. Pearce. 1930. 13 pp., 1 fig. Describes experiments

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- conducted to discover leaks in natural-gas lines by introducing ethyl mercaptan, a highly odorous substance.
- RI 3008. Laboratory and Field Tests of a Permissible Indicating Methane Detector, by A. B. Hooker, W. J. Fene, and R. D. Currie. 1930. 14 pp. Shows results of a series of tests made under different conditions and in various atmospheres, and concludes that this detector is suitable for use by fire bosses in making daily inspections because it is quick and reasonably accurate.
- †RI 3009. The Sand and Gravel Safety Contest of 1929, by W. W. Adams. 1930. 24 pp. Compares the safety records of the 29 plants participating in the 1929 safety contest conducted by the Bureau and the National Sand and Gravel Association.
- †RI 3010. Cooperative Research Between the United States Bureau of Mines and the Safety in Mines Research Board, by R. V. Wheeler and G. S. Rice. 1930. 4 pp. Presents summary of work conducted jointly during the past calendar year by the two organizations.
- †RI 3011. A Study of the Marshall-Bird Test for Determining the Agglutinating Value of Coal, by K. A. Johnson and H. F. Yancey. 1930. 7 pp., 3 figs. Presents a study of some of the important variables affecting agglutinating value and compares results obtained in different laboratories by different persons.
- †RI 3012. Washability Studies of the Mary Lee Seam at Lewisburg, Ala., by B. M. Bird, B. W. Gandrud, and E. B. Nelson. 1930. 32 pp., 15 figs. Gives data obtained from screen-sizing and float-and-sink tests of the raw coal.
- RI 3013. Toxicity of Dichlorodifluoromethane: A New Refrigerant, by R. R. Sayers, W. P. Yant, John Chornyak, and H. W. Shoaf. 1930. 15 pp., 1 fig. Concludes that possibility of health and accident hazards from exposure to dichlorodifluoromethane used as a refrigerant is remote.
- †RI 3014. Washability Studies of the Clark Seam at Marvel, Ala., by B. M. Bird, B. W. Gandrud, and N. L. Kozlinsky. 1930. 17 pp., 10 figs. One of a series of papers on the washability of Alabama coals. Contains results of screen-sizing and float-and-sink tests of a representative sample of raw slack, and slotted-screen tests showing the proportions of flaky particles in certain selected sizes.
- †RI 3015. Rock-Dusting in Coal Mines of the State of Washington, by S. H. Ash and John G. Schoning. 1930. 11 pp., 1 fig. Points out the need of rock-dusting in the bituminous-coal mines of the State where methane is generated and the explosibility factor of the dry coal dust is high. Describes rock-dusting methods and equipment used in the Roslyn field and at Bellingham. Shows a rock-dusting machine for use where compressed air is available.
- †RI 3016. The Lower Limits of Inflammability of Natural Gas-air Mixtures in a Large Gallery, by J. E. Crawshaw. 1930. 13 pp., 1 fig. Reports result of tests made (1) to determine the lower limit of natural gas in mixtures that ignite and propagate violently under turbulence produced by explosives fired from a cannon; (2) to observe the behavior of mixtures containing less than this low limit; and (3) to determine how turbulence produced by a fan affects this limit.
- †RI 3017. A New Flame Safety Lamp Testing and Demonstration Apparatus, by W. P. Yant, L. B. Berger, and G. S. McCaa. 1930. 10 pp., 2 figs. Describes a simple and efficient testing box for examination of a flame safety lamp for defects permitting propagation of flame to the surrounding atmosphere. Determines the ability of certain combustible liquids to propagate flame through a protecting gauze punctured with holes of a given size.
- †RI 3018. Gravity Concentration on Certain Florida Phosphatic Sands, by H. M. Lawrence and R. G. O'Meara. 1930. 8 pp. Reports that concentrates with higher phosphate content than the minimum commercial grade were produced by gravity concentration of certain types of low-grade phosphatic sands now regarded as waste. States that the recoveries were sufficient to justify consideration.
- †RI 3019. The National Safety Competition of 1929, by W. W. Adams. 1930. 19 pp. Presents the general results of the contest. Gives tables showing general scope of competition, scale of time losses for weighing deaths and permanent injuries to show severity of accidents, and accident rates for mines and quarries.
- †RI 3020. Influence of Washing Coal on Coke Properties and on Gas and Byproduct Yields, by A. C. Fieldner. 1930. 13 pp., 1 fig. Tells what results may be expected from use of washed coal in a carbonized plant. Discusses growth and methods of coal cleaning.
- RI 3022. The Use of Boiler Feed-Water Heaters with Steam-Powered Rotary Drilling Equipment, by E. C. Reistle, Jr. 1930. 14 pp., 5 figs. Compares and describes types of heaters and gives results of field tests of open and closed types. Operating suggestions for open-type heaters are given. Of equal importance with the ability of the heaters to decrease fuel consumption is the fact that they effect water economy by recovering water suspended in exhaust steam and condensed from the exhaust steam while heating the cold feed water. Heating the feed water also causes the precipitation of a part of the scale-forming material and modifies setup in the boiler adjacent to the feed-water intake.
- †RI 3023. Increased Recoveries of Phosphate in the Land-Pebble District of Florida, by H. M. Lawrence. 1930. 9 pp. Summarizes results of study of typical phosphate ores and of the material rejected by washing plants. States that difference in ore characteristics markedly affects recoveries by washing and screening, and that increased recoveries are obtained by re-treatment of washer rejects. Discusses present washing practice, typical phosphate ores, decreased losses of commercial fractions in washer rejects, and development of washer operations to obtain increased recoveries of phosphate rock.
- †RI 3024. Dissolution of Various Manganese Minerals, by C. W. Davis. 1930. 11 pp., 1 fig. The first of a series of papers being prepared during a study of the hydrometallurgy of manganese which is being carried on in an endeavor to make possible the utilization of low-grade domestic manganese ores. The reagents used for dissolution and the ores and minerals treated are given. Experimental data are discussed. (See also RI 3033.)
- †RI 3026. A Survey of the Sulfur Content of Commercial Motor Fuels—1930, by A. J. Kraemer. 1930. 11 pp. Reviews results of previous work on sulfur content of motor fuels and gives results of examination of 153 samples for sulfur content, doctor test, copper-strip corrosion, and color.
- †RI 3027. Acrolein as a Warning Agent for Detecting Leakage of Methyl Chloride from Refrigerators, by W. P. Yant, H. H. Schrenk, F. A. Patty, and R. R. Sayers. 1930. 11 pp., 1 fig. Summarizes results obtained to date in experiments being made to test the efficacy and suitability of acrolein for use as a warning agent in poisonous gases.
- RI 3028. Some Experiments on the Initiation of Coal-Dust Explosions by Gas Explosions, by G. S. Rice, H. P. Greenwald, and H. C. Howarth. 1930. 9 pp., 2 figs. Describes preliminary tests at the Bureau's Ex-

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perimental mine to determine, under conditions that may prevail in a bituminous coal-mine heading, how small a quantity of fire damp when ignited may bring coal dust into suspension and ignite it. Tests show that the explosion of as little as 150 cubic feet of gas-air mixture containing 9 percent gas may start a disastrous explosion of coal dust.

RI 3030. Test of Ampoules Filled with Palladium Salt Solution for Detecting Carbon Monoxide, by L. B. Berger and W. P. Yant. 1930. 9 pp. Reports results of sensitivity and reliability tests of the palladium chloride-filled ampoule type of carbon monoxide detector manufactured under license of U. S. Patent 1644014. Tests were made at various temperatures, and sensitivity was found to decrease at low air temperatures. A difference was found in detectors from two manufacturers. It was observed that gasoline vapor, ethylene, hydrogen, and hydrogen sulfide produced a color change in the ampoules similar to that produced by CO.

†RI 3031. Acrolein as a Warning Agent for Detecting Leakage of Methyl Chloride from a Multiple Refrigeration System, by H. H. Schrenk, F. A. Patty, and W. P. Yant. 1930. 7 pp., 1 fig. Describes investigation undertaken in cooperation with a manufacturer of refrigerators on the use of acrolein for detecting leakage of refrigerant from a multiple system, as installed in an apartment house.

†RI 3032. A Study of the Properties of Texas Polyhalite Pertaining to the Extraction of Potash. Part II. The Rate of Decomposition of Polyhalite by Water and by Saturated Sodium Chloride Solutions, by H. H. Storch. 1930. 11 pp., 3 figs. Describes results obtained by a study of the rate of decomposition of polyhalite by water and saturated salt solutions. (See also RI 3002, 3061, 3062, 3116, 3167, 3210, and 3237.)

†RI 3033. The Action of Sulfur Dioxide on Manganese Oxides at Elevated Temperatures, by C. W. Davis. 1930. 16 pp., 1 fig. Second in a series of reports on hydrometallurgy which, it is hoped, will make possible the utilization of large deposits of low-grade manganese ores. (See also RI 3024.)

RI 3034. Effectiveness of Different-Size Rock Dusts in Preventing Coal-Dust Explosions in Mines, by G. S. Rice, H. P. Greenwald, and H. C. Howarth. 1930. 10 pp., 1 fig. Reviews past investigations in experimental mine and reviews recent series of tests with rock dust of various sizes. Discusses present status of rock-dusting.

†RI 3035. Recovery of Oil from Sands by the "Gas-Drive," by Joseph Chalmers, I. H. Nelson, and D. B. Talliaferro. 1930. 12 pp., 6 figs. Describes method of stimulating production of oil by injecting gas or air into wells.

RI 3036. Tests of the Strength of Concrete Stoppings Designed to Resist the Pressure of Explosions in Coal Mines, by G. S. Rice, H. P. Greenwald, and H. C. Howarth. 1930. 11 pp., 5 figs. Gives results of tests of strength of stoppings to resist explosion pressures and concludes from these tests that (1) sudden or impact pressure is no more severe in disruptive effects than static pressure caused by compressed air or hydraulic means; (2) buttressing increases strength of concrete stopping; (3) the stopping must have a ratio of thickness to span of 1 to 10 to resist a pressure of 50 pounds per square inch; and (4) additional strength is obtained by recessing and anchor bolts.

†RI 3038. Survey of Fuel Consumption at Refineries in 1929, by G. R. Hopkins. 1930. 11 pp., 2 figs. Presents information obtained in a special canvass of refining companies. Considers consumption by fuels and by districts, and gives a table showing these data in condensed form. Discusses new methods and equipment that have promoted fuel efficiency.

†RI 3039. The Trauzl Block Strength Test of Dynamites, by N. A. Tolch and G. St. J. Perrott. 1930. 10 pp., 3 figs. Presents strength data on dynamites as determined with the Trauzl lead block and compares the results with those obtained by means of the ballistic pendulum.

†RI 3040. The Response of Japanese Waltzing Mice and Canaries to Carbon Monoxide and to Atmospheres Deficient in Oxygen, by W. P. Yant, F. A. Patty, H. H. Schrenk, and L. B. Berger. 1930. 12 pp. Compares response of Japanese waltzing mice and of canaries to such atmospheres and correlates the results obtained with the response of man. Concludes that, although waltzing mice appear to be slightly more sensitive to atmospheres deficient in oxygen than canaries and the latter slightly more sensitive than man, the margin of time between serious response of man and observable response of these animals is not wide enough for either canaries or waltzing mice to be of practical use for avoiding harmful exposure of man.

†RI 3041. Reviews of Fatalities in the California Petroleum Industry During the Calendar Year 1929, by R. L. Marek. 1930. 31 pp. Describes fatalities in four divisions of petroleum industry, analyzes causes, and gives suggestions for avoiding repetition.

†RI 3042. Extinction of Methane Flames by Dichlorodifluoromethane, by G. W. Jones and G. St. J. Perrott. 1930. 4 pp., 1 fig. Finds that extinctive effect is almost identical with that of carbon tetrachloride on a volumetric basis.

†RI 3043. The Use and Value of Air Analyses in Illinois Mines, by A. U. Miller. 1930. 19 pp. Reviews recommendations of Mine Safety Board and their application to conditions in Illinois.

†RI 3044. Coal-Dust Explosions in Mines Caused by Direct Electrical Ignition, by G. S. Rice, H. P. Greenwald, and H. C. Howarth. 1930. 7 pp., 3 figs. Gives test showing disaster that results when coal dust is ignited by an arc in a mine and emphasizes the need of rock-dusting on haulageways.

†RI 3045. Concentration Tests on the Manganiferous Iron Ores, by F. D. DeVaney and J. B. Clemmer. 1930. 9 pp. Describes results of tests of Cuyuna ores to determine the possibility of applying the flotation process to their treatment and to learn whether table concentration of classified feeds might be feasible.

†RI 3047. Method of Measuring Voids in Porous Materials, by J. D. Sullivan, G. L. Oldright, and W. E. Keck. 1930. 8 pp. Description of a method which measures the penetration of solutions into the voids within porous materials and the volume of these voids, without concern for interstitial space between particles.

†RI 3048. Study of High-Manganese Slags in Relation to the Treatment of Low-Grade Manganiferous Ores, by C. H. Herty, Jr., J. E. Conley, and M. B. Royer. 1930. 4 pp. Reports results of basic study of properties of high-manganese slags to determine whether it is possible to produce fluid slags by proper selection of composition or by addition of cheap flux, introducing no new difficulties in the subsequent process.

†RI 3049. Concentration of Chromite, by H. A. Doerner. 1930. 8 pp. States that after proper grinding and classification tabling will generally produce a satisfactory separation of chromite from the minerals with which it is usually associated. The presence of low-grade chromite is responsible for most of the limitations of concentration.

†RI 3050. Leaching Copper Ores: Advantages of Wet-Charging, by John D. Sullivan and Alfred P. Towne. 1930. 26 pp., 2 figs. Reports results of study to determine a way by which slimes can be handled in percolation leaching. States that the method of charging the ore into leaching vats governs the distribution of

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- the fines and consequently the rate of extraction of copper.
- †RI 3051. Hauling Coal Safely with Permissible Storage-Battery Locomotives, by C. W. Owings. 1930. 18 pp. Concludes from a comparison of permissible and nonpermissible haulage equipment that the permissible storage-battery locomotive can gather and haul coal as cheaply as the nonpermissible types and is safer to operate if maintained in safe condition, trolley wires are adequately guarded, and cables are connected through permissible junction boxes.
- †RI 3052. Concentration Tests on Tailings from the Washing Plants of the Mesabi Range, Minn., by F. D. DeVaney and W. H. Coghill. 1930. 21 pp. Describes ores and washing practice of the Mesabi range district, outlines and gives results of magnetic and gravity concentration tests to recover the iron content of two sludge-pond samples.
- RI 3054. Fundamental and Applied Research on the Physical Chemistry of Steel Making, by C. H. Herty, Jr. 1930. 12 pp., 3 figs. Outlines a series of fundamental studies on the action of oxygen in liquid steel and the application of the findings to open-hearth operation.
- †RI 3055. Accelerated Laboratory Test for Determination of Slacking Characteristics of Coal, by A. C. Fieldner, W. A. Selvig, and W. H. Frederic. 1930. 24 pp., 3 figs. Describes preliminary experiments, sampling, method of test, and results of tests and check tests. Discusses slacking, relation of bed moisture to slacking and to slacking indices, and relation of slacking indices to rank of coal. Classifies coals in order of slacking tendency.
- †RI 3056. A Device for Determining Work Input to a Laboratory Ball Mill, by John Gross and S. R. Zimmerman. 1931. 3 pp., 2 figs. Describes power-recording apparatus for measuring the work input at the ball mill itself in order to eliminate the factor of motor efficiency and transmission losses. Calibration of the integrator with a Prony brake and by means of a static load is given, and the use of the calibration curve is explained.
- †RI 3057. Process for Extracting Radium from Carnotite, by H. A. Doerner. 1930. 35 pp., 4 figs. States that a modification of the nitric acid process seems to be best adapted to treatment of slime concentrates, although a new method involving volatilization of the silica as fluoride, especially adapted to the treatment of slime, has interesting possibilities.
- †RI 3059. Development and Production History on the Salt Flat and Other Fault Fields of East Texas, by H. B. Hill, E. V. H. Bauserman, and C. B. Carpenter. 1931. 46 pp., 13 figs. Gives amounts and comparative data of water production for leases and wells in Salt Flat, Luling, and surrounding fields.
- RI 3060. Rock-Dusting a Pennsylvania Coal Mine, by C. W. Owings. 1931. 12 pp. Describes rock-dusting practices of one of the most thoroughly rock-dusted mines in the United States. Gives analyses of the road-dust samples and compares chemical analysis and volumeter determination of incombustible matter in the samples.
- †RI 3061. A Study of the Properties of Texas Polyhalite Pertaining to the Extraction of Potash. III. Calcination of Polyhalite in a Rotary Kiln of Laboratory Size, by Loyal Clarke, J. M. Davidson, and H. H. Storch. 1931. 12 pp., 2 figs. Describes construction and operation of rotary kiln. Gives results of study of the variables and of factors affecting extraction procedure. Discusses results of calcination extraction experiments on 10- to 100-mesh Polish polyhalite and on such polyhalite of other degrees of fineness. (See also RI 3062, 3032, 3062, 3116, 3167, 3210, and 3237.)
- †RI 3062. A Study of the Properties of Texas Polyhalite pertaining to the Extraction of Potash. IV. Experiments on the Production of Potassium Chloride, by the Evaporation of Leach Liquors from Decomposition of Uncalcined Polyhalite by Boiling Saturated Sodium Chloride Solutions, by H. H. Storch and F. Fraas. 1931. 7 pp. Reports that evaporation of 90 percent of the water of the leach liquors interspersed with three crystallization steps will yield 78 percent of the potash as crude KCl which may be readily refined to produce pure KCl. The preliminary production cost estimate is about \$20 per ton. The possibility of industrially workable deposits of sylvinite in Texas and New Mexico is mentioned. (See also RI 3061.)
- †RI 3064. Oxygen as an Aid in the Dissolution of Silver by Cyanide from Various Silver Minerals, by E. S. Leaver, J. A. Woolf, and N. K. Karchmer. 1931. 15 pp. Presents results of tests made to show the rate of dissolution of silver from each of the common minerals in cyanide solution. The effect of oxygen on the dissolution of silver is shown by comparing the results of the different methods of supplying oxygen. Concludes that oxygen is helpful in treatment of silver minerals by cyanidation, particularly for refractory minerals slow of dissolution. Warm solutions increase the dissolution rate. A preliminary low-temperature roast will usually produce a calcine amenable to cyanidation.
- †RI 3065. Trends in the Production and Uses of Granite as Dimension Stone, by Oliver Bowles and Paul Hatmaker. 1931. 21 pp., 11 figs. Describes general economic conditions from 1906 to 1928, and outlines trends in the industry by States, discusses its problems, and suggests means of improvement and expansion.
- †RI 3066. The Use of Aluminum for Oil Lease Tanks: Part I, Field Tests, by Ludwig Schmidt, J. M. Devine, and C. J. Wilhelm. 1931. 17 pp., 3 figs. Presents results of a 1-year test of an all-aluminum stock tank of 500 barrels capacity and of a "composite" tank of equal capacity having a steel bottom and bottom ring and an aluminum top and top ring. Under certain operating conditions aluminum was shown to have promising possibilities for use in building lease tanks because of its resistance to the corrosive action of hydrogen sulfide gas. The limitation of aluminum for this use are listed.
- †RI 3067. Washability Studies of the Mary Lee Bed at Hull Mine, Dora, Ala., by B. M. Bird, A. C. Richardson, and G. D. Coe. 1931. 24 pp., 13 figs. Contains results of screen-sizing and float-and-sink tests of a representative sample of run-of-mine coal and flakiness and crushing tests of certain sizes of the coal.
- †RI 3068. Flotation Tests on Converter Slag, by Frank S. Wartman. 1931. 7 pp. Describes experimental flotation work undertaken to test conclusions derived from a previous study of samples of converter slag. These tests show that it is possible to recover by flotation about 90 percent of the copper content of a converter slag containing 3 percent copper, and to obtain flotation concentrates which have a copper content of 35 percent.
- †RI 3070. A Study of Falls of Roof and Coal in Mines in the No. 8 Field of Eastern Ohio, by J. W. Paul and L. N. Plein. 1931. 32 pp., 37 figs. Notes fatalities which have resulted from falls of roof in mines of the No. 8 bed and gives a brief description of the field and its geology. The mining methods, regulations, and timbering practices, with supervision and discipline, are presented and discussed, since all of these factors affect control of roof accidents.
- †RI 3072. The Reaction Between Magnetite and Ferrous Sulfide, Part II, by F. S. Wartman and G. L. Oldright. 1931. 10 pp., 7 figs. Reports results of a study of the effect of silica, magnesium, lime, alumina, and

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- cuprous sulfide on the rate of the ferrous sulfide-magnetite reaction. (See also RI 2901.)
- †RI 3073. Extraction of Soluble Copper from Ores in Leaching by Percolation, by J. D. Sullivan and K. O. Bayard. 1931. 43 pp., 20 figs. Describes and discusses experiments with various ores to determine the factors governing the rate of removal of water-soluble copper from leached ores.
- RI 3074. Properties of California Crude Oils. IV. Additional Analyses, compiled by A. J. Kraemer. 1931. 12 pp. Gives individual analyses of eight crudes and discusses results of analyses. (See also RI 2595, 2608, 2846, and 3362.)
- †RI 3076. Absorption of Nitrogen by Steel, by R. S. Dean. 1931. 8 pp., 2 figs. Points out the necessity for controlling the nitrogen content of steel, with the control of impurities suggested as a first step. Notes need of data on effect of impurities and of denitrifiers on nitrogen absorption.
- †RI 3077. Note on Copper-Constantan Thermocouple Calibration below 0° C., by R. H. Wiebe and M. J. Brevoort. 1931. 7 pp., 1 fig. Outlines experimental work and gives results which show that each thermocouple must be calibrated individually to secure an accuracy of about 0.05° C.
- †RI 3078. Diatomite as a Filler in Battery Boxes, by Paul Hatmaker. 1931. 2 pp. Briefly discusses this use of diatomite, and lists manufacturers of battery boxes.
- †RI 3079. Recent Developments in Byproducts from Bituminous Coal, by A. C. Fieldner. 1931. 13 pp., 7 figs. Reviews trends in value of byproducts, considers their present economic status and discusses competitive sources of gas for industrial and domestic use, chemical utilization of coke-oven gas, competition between synthetic and byproduct ammonia, use of sulfur in gas for making ammonium sulfate, sulfur recovery processes, production of phenols from still wastes, production of benzol and light oils, production of resins from light-oil compounds, tar and tar products, and the hydrogenation of coal tar.
- †RI 3080. The Production of High-Manganese Slag in the Electric Furnace, by T. L. Joseph, C. E. Wood, and E. P. Barrett. 1930. 9 pp., 2 figs. Describes tests made to determine the possibilities of the electric furnace in this problem and to study the fluxing effect of aluminum on high-manganese slags.
- †RI 3081. Laboratory Studies of the Deoxidation of Steel with Manganese-Silicon Alloys, by C. H. Herty, Jr., and G. R. Fitterer. 1930. 14 pp., 3 figs. Discusses present use of deoxidizers, rate of elimination of inclusions, factors affecting particle size, the system FeO-MnO-SiO₂, and formation of iron-manganese silicates in steel. Outlines experimental procedure and results.
- RI 3083. Washability Studies of the Black Creek Bed at Bradford Mine, Dixiana, Ala., by B. M. Bird, B. W. Gandrud, and C. B. Barmore. 1931. 12 pp., 9 figs. One of a series on the washability of Alabama coals. Contains screen-sizing and float-and-sink tests of a representative sample of the raw coal and flakiness tests showing the proportions of flaky particles in certain selected sizes. Crushing tests have not been considered necessary. (See also RI 3165 and 3450.)
- RI 3084. The Propulsive Strength and Rate of Pressure Development of the Cardox Blasting Device, by N. A. Tolch and G. St. J. Perrott. 1930. 7 pp., 5 figs. Describes device and gives procedure and results of tests to observe the effect of variables determining the strength of Cardox and of tests to determine the rate of pressure development of the Cardox model G shell.
- †RI 3085. Separation of Kyanite and Mica from Quartz, Feldspar, and Other Gangue Minerals of a Mica Schist, by F. F. Hintze and L. H. Lange. 1930. 6 pp. States object of experimental work, outlines method of analysis for kyanite, describes preliminary tests and quantitative tests, and gives results of screen analysis of minus 20-mesh material and of tabling tests.
- RI 3086. Note on Julius Suspensions, by M. J. Brevoort. 1931. 2 pp., 1 fig. Describes construction and adjustment of a modified form of the Julius suspension used to protect high-sensitivity galvanometers at the Amarillo helium plant.
- RI 3088. Smelting in the Lead Blast Furnace. Handling Rich Ores. VI. Conditions and Problems Introduced by Increasing Ratio of Concentration, by G. L. Oldright and Virgil Miller. 1931. 7 pp. One of a series of studies of lead blast-furnace problems. Gives history of operations at the Bunker Hill smelter, and discusses influence of flotation on increasing grade of concentrates, other processes that may influence grade of product received by smelters, difficulties introduced by flotation and suggested changes, and changes in operation of blast-furnace plants. (See also RI 2954, 2957, 2963, 2965, 2966, 3094-3096, 3133, 3243-3246, and 3264.)
- RI 3091. Reduction of Zinc Oxide by Methane or Natural Gas, by H. A. Doerner. 1931. 14 pp., 7 figs. Gives results of work to determine whether or not the reaction rates between zinc oxide and methane are such that reaction 1 ($ZnO + CH_4 = Zn \text{ (gas)} + CO + 2H_2$) will predominate and take place with sufficient speed for commercial application.
- †RI 3094. Smelting in the Lead Blast Furnace. Handling Rich Charges. Part VII. Methods of Charging, Rate of Subsidence of the Charge, and Accretions Made, by G. L. Oldright and Virgil Miller. 1931. 11 pp., 2 figs. One of a series of papers on problems of smelting in the lead blast furnace. Describes conditions of operation and method of charging. Gives results of observations of rate of subsidence of charge column during smelting and of accretions. (See also RI 2954, 2957, 2963, 2965, 2966, 3088, 3095, 3096, 3133, 3243-3246, and 3264.)
- †RI 3095. Smelting in the Lead Blast Furnace. Handling Rich Charges. Part VIII. The Gases from the Top of the Furnace, by G. L. Oldright and Virgil Miller. 1931. 19 pp., 1 fig. One of a series of papers on smelting in the lead blast furnace. (See also RI 3094.)
- RI 3096. Smelting in the Lead Blast Furnace. Handling Rich Charges. Part IX. Conditions at the Tuyère Zone, by G. L. Oldright and Virgil Miller. 1931. 21 pp., 5 figs. One of a series of papers on problems of the lead blast furnace. Pertains to distribution of air between tuyères, sampling gases at the tuyère zone, temperatures of slags and lead bullion in the crucible, general appearance of tuyère zone, cleaning of dirty slags, and slags made both at tuyères and later. (See also RI 3094.)
- RI 3097. The Acidity of Bennett Branch of Sinnemahoning Creek, Pa., During Low Water, by R. D. Leitch. 1931. 6 pp., 2 figs. Reports results of a study of the effect of a period of extreme low water on the acidity of Bennett Branch.
- †RI 3098. General Review of the United States Bureau of Mines Stream-Pollution Investigation, by R. D. Leitch. 1931. 7 pp. Presents general facts on coal-mine drainage that have been gathered during the past 5 years.
- †RI 3101. Re-Treatment of Sayreton Jig Middlings on Coal-Washing Tables, by A. C. Richardson and B. W. Gandrud. 1931. 6 pp., 1 fig. Discusses results of tests.
- †RI 3102. The Acidity of Black Lick, Two Lick, and Yellow Creeks, Pennsylvania, During Low Water in 1930, by R. D. Leitch. 1931. 7 pp., 1 fig. Another of the series on the effect of drought and low water on the pollution of streams by coal-mine drainage.
- RI 3104. The Overheating of Rubber-Sheathed Trail- ing Cables, by L. C. Hasley and A. B. Hooker. 1931.

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- 10 pp., 4 figs. A report of a study of the general performance of factors that determine the heating of trailing cables. Points out need of larger conductor cables and more efficient power distribution. Gives data on general performance of trailing cables and on factors determining their heating. Points out need of larger conductor cables and more efficient power distribution.
- †RI 3105. Flotation of Low-Grade Phosphate Ores—II, by H. M. Lawrence and E. Roca. 1931. 9 pp. Discusses certain features of laboratory study of flotation of ground and unground phosphatic sands. Gives further study of combinations of reagents for flotation and evolves a relatively inexpensive method, including period of conditioning with sodium sulfite followed by flotation with oleic acid.
- †RI 3106. Leaching Oxidized Copper Ores: Effect of Strength of Acid in Leaching Solvent, by John D. Sullivan and G. L. Oldright. 1931. 9 pp., 4 figs. Considers rate of dissolution of copper from ores of the Southwest in sulfuric acid of varying strengths and the rate of sulfuric acid consumed to copper dissolved.
- †RI 3107. A Practical Method of Solving the Emergency Manganese Problem, by C. H. Herty, Jr. 1931. 7 pp. Presents results of work on deoxidation of steel with manganese-silicon alloys which may be produced from domestic manganese ores. This would effect a substantial reduction in this country's requirements of manganese.
- †RI 3109. Gases in Manholes: A Survey of a Utility in Boston, Mass., by G. W. Jones and G. St. J. Perrott. 1931. 16 pp., 3 figs. Reports results of survey, extending over a year, to determine the general hazards of combustible gases and vapors in manholes and other underground openings under conditions considered typical of any public utility in the electric-light and power field. (See also RI 3192, 3213, 3260, 3305, 3321, 3375, 3433, and 3604.)
- RI 3110. A Study of Falls of Roof and Coal in Mines of Harrison County, W. Va., by J. W. Paul and J. N. Geyer. 1931. 30 pp., 14 figs. One of three papers giving results of a study of safeguards employed in coal mines to protect workmen from falls of roof and coal. Features and practices found to promote protection are summarized, and additional safeguards are suggested. (See also TP 520 and 522.)
- †RI 3111. The Effect of Certain Operating Variables on the Efficiency of the Coal-Washing Tables, by H. F. Yancey and C. G. Black. 1931. 13 pp., 3 figs. Gives results of tests to establish the relationship which energy input, distribution, and rate of feed or tonnage treated bear to the efficiency of the separation on a coal-washing table. Contains data on the amount of water required in tabling coal.
- RI 3112. Flotation Reagents, 1929, by T. H. Miller and R. L. Kidd. 1931. 20 pp. Seventh of a series of yearly reviews presenting flotation reagent, consumption data, and other milling information of value to the milling industry and to manufacturers of flotation reagents. (See also RI 2203, 2709, 2777, 2852, 2931, and 3004.)
- RI 3113. Roof Support in Coal Mines in the Irwin, Greensburg, and Latrobe Basins, Westmoreland County, Pa., by J. W. Paul, H. Tomlinson, and S. J. Craighead. 1931. 77 pp., 17 figs. Presents results of study of 12 mines operating in the Pittsburgh bed. Includes tabulation of accidents, tonnages, and other data for each mine, with information on mining methods, lists of commendable practices, and recommendations for improvement. (See also TP 541 and 550.)
- †RI 3114. Some Experimental Data on the Influence of Dry and Wet Cleaning on Coke Properties and on Gas and Byproduct Yields of Pittsburgh and Mary Lee Coals, by A. C. Fieldner. 1931. 9 pp., 6 figs. Contains comparative laboratory results obtained with a sample of Pittsburgh coal, raw and air-cleaned; comparative coke-oven results with ¾-inch lump unwashed Pittsburgh bed coal, and water-washed coal from the same bed, but only in part from the same group of mines; and laboratory carbonization tests on the same 2-ton sample of Mary Lee coal, part unwashed and part washed on wet tables.
- †RI 3116. A Study of the Properties of Texas-New Mexico Polyhalite Pertaining to the Extraction of Potash. V. Suggested Processes for the Production of Syngenite and Byproduct Magnesia, by H. H. Storch and N. Fragen. 1931. 19 pp., 2 figs. Commercially feasible processes producing potassium sulfate or syngenite or both are suggested and flow diagrams given. Points out that precipitation of magnesium ammonium carbonate followed by thermal decomposition may be of value in developing a process having MgO as a byproduct. (See also RI 3002, 3032, 3061, 3062, 3167, 3210, and 3237.)
- †RI 3117. Cooperative Research Between the United States Bureau of Mines and the Safety in Mines Research Board. Report for 1929, by R. V. Wheeler and G. S. Rice. 1931. 6 pp. Annual report of the cooperative mine-safety research program undertaken by the organizations named. Bibliography of publications on cooperative work.
- †RI 3118. Explosive Crushing of Minerals, by R. S. Dean and John Gross. 1932. 5 pp., 5 figs. Discusses nature of expandable substances; the effect of pressure, varying amount of water, and time of soaking; and explosive experiments on ores.
- RI 3119. The Acidity of Several Pennsylvania Streams During Low Water, by R. D. Leitch. 1931. 10 pp., 5 figs. Compares the results obtained for extreme low water of 1930 and for other years.
- †RI 3120. Determination of Magnetite in Copper Slags, by Lathrop E. Roberts and R. L. Nugent. 1931. 14 pp., 1 fig. Reports results of tests to determine whether possible sources of error in the Hawley method actually introduce great error and compares results obtained by the Hawley method with those by the use of the magnetic balance. Introduces an advantageous modification of the Hawley method.
- RI 3121. Comparison of Storage-Battery and Cable-Reel Locomotives in a West Virginia Coal Mine, by C. W. Owings. 1931. 10 pp. Comparison indicates that the two types of locomotives are about equal in performance; however, storage-battery locomotives are more economical, safer, and in event of power failure can continue to operate.
- †RI 3122. Tests on Brick Kilns with a Stoker, by W. E. Rice and R. E. Faller. 1931. 20 pp., 2 figs. Results of tests to determine whether it is feasible to fire a large kiln with a single stoker, whether the use of a single furnace simplifies control, and whether the admission of all the hot gas at the center of the kiln will give symmetrical distribution of heat.
- †RI 3126. The National Safety Competition of 1930-31, by W. W. Adams. 1931. 12 pp. Names winners of awards in the various groups and gives accident data for classified mines of 1931.
- †RI 3127. A Novel Method of Ventilating a Pennsylvania Coal Mine, by C. W. Owings. 1931. 8 pp. Describes a simplified system of ventilation applicable to any panel system of mining or to mechanized mining.
- RI 3128. Hydrogen Sulfide Content of the Gas in Some Producing Oil Fields, by J. M. Devine and C. J. Wilhelm. 1931. 15 pp., 1 fig. Report of continued work on hydrogen sulfide problem. Gives results of analyses for hydrogen sulfide of samples from 165 wells representative of typical gas production in 15 different fields in Illinois, New Mexico, and Texas.
- RI 3130. Properties of Typical Crude Oils from the East Texas Field, by E. L. Garton. 1931. 7 pp. Con-

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- tains analyses of oil samples from the east Texas and the east-central Texas districts.
- RI 3131. The Use of Aluminum for Oil-Lease Tanks. Part II. Laboratory Tests, by L. Schmidt, J. M. Devine, and C. J. Wilhelm. 1931. 16 pp., 3 figs. Gives results of laboratory corrosion studies made in connection with a 1-year test on aluminum oil-lease tanks conducted by the bureau.
- RI 3132. Experiments to Determine the Minimum Amount of Coal Dust Required for Propagation of a Mine Explosion, by G. S. Rice and H. P. Greenwald. 1931. 3 pp. Reviews experiments leading to the conclusion that no coal mine can be clean enough to be free of the hazard of dust explosions if a source of ignition is introduced.
- †RI 3133. Sand and Gravel Contest of 1930, by W. W. Adams. 1931. 10 pp. Gives tables showing accident data for individual plants, scale of time losses for weighting deaths and permanent injuries to show severity of accidents, and causes of accidents at sand and gravel plants. Lists and fully describes accidents, giving number of days lost reported by sand and gravel plants.
- †RI 3134. Active List of Permissible Explosives and Blasting Devices Approved Prior to June 30, 1931. 1931. 15 pp. Describes classes of permissible explosives and gives permissible blasting devices tested under Schedule 20.
- †RI 3135. Apparatus for Determination of Hydrogen Sulfide in Gases, by J. W. Horne and W. B. Shirey. 1931. 6 pp., 2 figs. Deals with apparatus and methods used in determining amount of hydrogen sulfide evolved in laboratory experimental cracking stills from cracking of gases produced by distillation of oil shale under pressure.
- †RI 3138. Reduction of Evaporation Losses from Gasoline Bulk Storage-Station Tanks, by Ludwig Schmidt and C. J. Wilhelm. 1931. 11 pp., 5 figs. Describes tanks and gasoline used in tests, showing that light-colored paints, tank housing, and increased operating pressures reduce evaporation losses.
- †RI 3139. Added Recovery by Hydraulic Sizing of Fine Material in the Land-Pebble Phosphate District of Florida, by R. G. O'Meara. 1931. 5 pp., 1 fig. Gives results of tests on classification and tabling of phosphatic sands which show that the sizing obtained by a hydraulic classifier makes possible the recovery of phosphate formerly sent to waste.
- RI 3143. The Production of Motor Fuels from Natural Gas. I. Preliminary Report on Pyrolysis of Methane, by H. M. Smith, Peter Grandone, and H. T. Rall. 1931. 12 pp., 13 figs. Describes experimental procedure and apparatus and outlines results of tests pointing to possible commercial application of pyrogenic synthesis of gaseous, liquid, and solid hydrocarbons from methane.
- †RI 3145. Survey of Fuel Consumption at Refineries in 1930, by G. R. Hopkins. 1931. 12 pp., 2 figs. A review of the production and consumption of refinery fuels by districts, touching on developments that have reduced fuel consumption. Gives data on fuel used at refineries in the United States from 1925 to 1930 and in 1929 and 1930.
- †RI 3146. Acidity of Drainage from High-Pyritic Coal Areas in Pennsylvania, by R. D. Leitch. 1932. 15 pp., 1 fig. Gives results of analyses of samples of water draining from high-pyritic mines to determine what effect such coal has on the acidity of water.
- †RI 3148. Concentration of the Rake Discharge from a Bowl Classifier in a Washing Plant of the Mesabi Range, Minn., by F. D. DeVaney and W. H. Coghill. 1932. 7 pp. Describes tests showing that fines from ores of the jiggling type are readily concentrated by classification and tabling.
- †RI 3149. Salts in the Tri-State Mill Waters: Their Ill Effect on the Flotation of Blende and Their Removal, by A. B. Campbell, Warren Howes, and W. H. Ode. 1932. 24 pp., 6 figs. Suggests removal of ferrous and ferric iron and free acid by alternate aeration and neutralization. Neutralization may be by upward percolation through high-grade limestone.
- †RI 3151. Micropyrometer for High-Temperature Melting Point, by G. R. Fitterer and M. B. Royer. 1932. 17 pp., 2 figs. Discusses the melting phenomenon, high-temperature melting-point methods, the micro-pyrometer, temperature calibration, melting points of standard samples and of refractory oxides and slags, precautions, and the system FeO-SiO₂ as an example of the application of the micropyrometer.
- †RI 3153. Factors Influencing the Flow of Natural Gas Through High-Pressure Transmission Lines, by W. B. Berwald and T. W. Johnson. 1931. 27 pp., 7 figs. Reviews pipe-line flow formulas and gives methods and results of making flow tests.
- †RI 3154. The Splicing of Rubber-Sheathed Trailing Cables, by L. C. Ilsley and A. B. Hooker. 1932. 7 pp., 3 figs. Contains instructions for splicing and vulcanizing broken cable.
- †RI 3156. Review of Fatalities in the California Petroleum Industry During the Calendar Year 1930, by R. L. Marek. 1931. 28 pp., 1 fig. Shows that the majority of the fatalities were in the drilling and producing divisions of the industry and that most of the accidents were preventable.
- RI 3157. Washability Data on Certain Coal Beds of Alabama, with Special Reference to Sulfur Elimination, by B. W. Gandrud, G. D. Coe, and M. F. Thomas. 1932. 28 pp., 11 figs. Gives results of an attempt, on the basis of float-and-sink data, to determine approximately the ash and sulfur reduction obtainable under given conditions in coals from various mines.
- RI 3159. Laboratory Batch Still and Fractionating Column for Production and Study of Lubricating Distillates Under Vacuum, by Boyd Guthrie and Ralph Higgins. 1932. 18 pp., 5 figs. Shows construction of laboratory-size batch still and fractionating column; presents data on operation of apparatus under vacuum to produce lubricating distillates.
- †RI 3160. The Effect of Oxygen on Gaseous Hydrogen Sulfide Corrosion of Steel, by J. M. Devine, C. J. Wilhelm, and Ludwig Schmidt. 1932. 19 pp., 8 figs. Gives results of laboratory tests, describing apparatus and methods of corrosion of steels under gaseous hydrogen sulfide conditions.
- †RI 3164. Selecting and Training the Refinery Personnel to Prevent Accidents, by R. L. Marek. 1932. 29 pp., 1 fig. Presents results of a study, made at various refineries in the United States, of the success of accident- and fire-prevention work effected by coordinated effort of the different departments.
- †RI 3165. Re-Treatment of Fine Washed Coal from the Black Creek and Mary Lee Beds on Coal-Washing Tables, by A. C. Richardson, G. D. Coe, H. J. Hager, and R. Q. Shotts. 1932. 12 pp., 18 figs. Reports progress of study to determine whether fine washed coal from jigs can be economically retreated on coal-washing tables. (See also RI 3085 and 3450.)
- †RI 3166. Determination of Iron Oxide in Liquid Steel, by C. H. Herty, Jr., Hyman Freeman, and M. W. Lightner. 1932. 10 pp. Describes a method of deoxidizing liquid steel by the addition of aluminum. The killed steel is analyzed for Al₂O₃, from which the FeO in the steel may be calculated.
- †RI 3167. A Study of the Properties of Texas Polyhalite Pertaining to the Extraction of Potash. VI. A Study of the Calcination of Polyhalite in a 6-by-182-Inch Rotary Kiln. Density Measurements as Control Tests for Efficiency of Calcination, by J. E. Conley, F. Fraas, and J. M. Davidson. 1932. 17 pp., 7 figs. Describes calcination of Polish and New Mexico

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- polyhalite in 6- by 132-inch rotary kiln, development of tests for measuring and controlling the degree of calcination, and extraction of 20-pound batches of polyhalite calcined in the rotary kiln. (See also RI 3002, 3032, 3061, 3062, 3116, 3210, and 3237.)
- †RI 3168. Determination of Volatile Matter in Low-Temperature Cokes, Chars, and Noncoking Coals, by H. M. Cooper, F. D. Osgood, and R. E. Solomon. 1932. 17 pp., 3 figs. A study of some of the factors affecting volatile matter determinations in those types of fuel which give erroneous results due to mechanical losses.
- †RI 3169. Absorbents for Liquid-Oxygen Explosives: Their Relation to Sensitiveness to Impact and Other Properties of LOX, by L. V. Clark, with an appendix by Arthur La Motte, 1932. 21 pp., 7 figs. Deals with examination of absorbents for LOX to determine their most desirable and undesirable characteristics, to find means of desensitizing absorbents to mechanical shock, and to determine the effect that such desensitization of absorbents has on the explosive characteristics of LOX.
- †RI 3170. Washability Studies of the Brookwood Bed at the Warrior View Mine, Tuscaloosa, Ala., by A. C. Richardson, G. D. Coe, and H. L. Anthony. 1932. 14 pp., 12 figs. Contains screen-sizing and float-and-sink tests of a representative sample of run-of-mine coal and flakness and crush tests on certain sizes.
- †RI 3171. Analytical Distillation of Coal Tar, by E. B. Kester, W. D. Pohle, and L. P. Rockenbach. 1932. 11 pp., 2 figs. Points out that distillation and fractionation of tar in one operation at atmospheric pressure may introduce large differences in duplicate determinations. Describes satisfactory double distillation method for reducing deviations resulting from cracking and improper fractionation, and shows that repeated distillations of low-temperature tar from a Hempel flask do not alter its composition materially.
- †RI 3172. Inflammability of Mixed Gases: Mixtures of Methane, Ethane, Hydrogen, and Nitrogen, by G. W. Jones and R. E. Kennedy. 1932. 12 pp., 3 figs. Limits of inflammability were both determined and calculated on test mixtures of complex gases. The results showed that actual limits of inflammability can be closely approximated by calculation. (See also B 279R and TP 450.)
- RI 3173. Some Methods of Separating Oil and Water in West Texas Fields and the Disposal of Oil-Field Brines in the Hendricks Oil Field, Texas, by R. E. Heithecker. 1932. 16 pp., 7 figs. Discusses the comparative merits of the water-trap and hay-tank methods of separation. Notes various ways of disposing of waste water.
- RI 3174. Properties of Crude Oil from the Greasewood Flat Area in Colorado, by H. P. Rue. 1932. 3 pp. Contains results of analysis, by the Bureau of Mines Hempel method, of two crude-oil samples.
- †RI 3176. The National Safety Competition of 1931, by W. W. Adams. 1932. 18 pp. Presents results of the 1931 competition and gives tables showing accident rates and relative standing of the competing companies.
- †RI 3177. Migration of Injected Gas Through Oil and Gas Sands of California, by H. C. Miller. 1932. 29 pp., 9 figs. Gives summary of preceding literature; general discussion of gas-injected methods, pressures and volumes injected, pressure gradient between injection and producing well, and spread of injected gas in reservoir sands; examples of gas-injection projects; and effect of gas injection to increase gasoline production.
- †RI 3178. The Use of Lime in a Salt Solution for Removing Hydrogen Sulfide from Natural Gas, by H. P. Rue. 1932. 8 pp., 2 figs. Reports that hydrogen sulfide can be removed economically from wet natural gas by means of a salt and lime solution by contacting the gas and solution in the proper scrubbing device. Notes the possibility that certain natural oil-field waters can be converted to the proper treating solution by adding relatively small amounts of certain chemicals.
- RI 3179. Do Fuses Protect Against Methane Ignition? by A. B. Hooker and E. J. Coggeshall. 1932. 13 pp. Gives results of tests of different-size fuses under various conditions. Smaller fuses were shown to give better protection against ignition of gas, but larger fuses are necessary for protection against overloading and excessive damage to the cable.
- †RI 3180. Analyses of Crude Oils from the Oklahoma City Field, Okla., by E. L. Garton. 1932. 29 pp. Analyses of 21 representative crude oils from various producing zones of the Oklahoma City field.
- †RI 3182. Review of Fatalities in the California Petroleum Industry During the Calendar Year 1931, by R. L. Marek. 1932. 22 pp., 2 figs. Describes causes and conditions which resulted in accidents in the various divisions of the industry. Notes that approximately 50 percent of the accidents are in drilling and producing division.
- †RI 3183. Smelting in Lead Blast Furnace, Handling Rich Charges. X. Preparation of the Charge, by G. L. Oldright and Virgil Miller. 1932. 50 pp., 12 figs. The tenth of a series of papers on smelting in lead blast furnace and the fifth on modifications brought about by introduction of richer charges. (See also RI 2954, 2957, 2963, 2965, 2966, 3088, 3094-3096, 3243-3246, and 3264.)
- RI 3184. Sanitary Surveys of Coal-Mining, Metal-Mining, and Smelter Towns of Utah, by Arthur L. Murray. 1932. 28 pp. A report on conditions that affect health, efficiency, and contentment of employees.
- RI 3185. Toxicity of Dichlorotetrafluoroethane, by W. P. Yant, H. H. Schrenk, and F. A. Patty. 1932. 10 pp. Notes chemical and physical properties of a new organic fluoride suitable for a refrigerant and gives results of tests in which animals were exposed to atmospheres containing various proportions of the substance.
- †RI 3186. Sand-and-Gravel Safety Contest of 1931, by W. W. Adams. 1932. 8 pp. Gives results of contest for 1931, with tables showing accident and severity rates at plants and names of winning plants.
- RI 3187. Protection Against Mercury Vapor Afforded by Canister Gas Masks, by W. P. Yant and C. El. Traubert. 1932. 11 pp. Describes procedure and presents detailed results, including preparation and sensitivity of selenium sulfide test papers for mercury vapor and tests of two charcoal-filled gas-mask canisters, three type-N gas-mask canisters, and two charcoal-filled respirator cartridges.
- RI 3188. A Study of Roof and Coal in Mines of Lincoln County, Wyo., by H. Tomlinson. 1932. 18 pp., 12 figs. One of a series presenting results of study of causes and methods of preventing accidents from falls of roof and coal in western coal mines.
- RI 3189. Falls of Roof and Coal in the Book Cliffs and Wasatch Plateau Coal Fields of Utah, by Herbert Tomlinson. 1932. 24 pp., 16 figs. Summarizes data obtained at 12 mines, representative of the various physical characteristics of principal coal beds. Notes physical and operative features influencing falls.
- †RI 3190. Economics of Potash Recovery from Wyomingite and Alunite, by J. R. Thoenen. 1932. 78 pp., 8 figs. Contains data from a field survey of deposits as to accessibility for exploitation, probable location of treatment plants, source and cost of raw materials, and probable markets for products. Gives information obtained from study of patents concerning operating costs and processes having attractive financial possibilities.

†Out of print.

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- RI 3191. The Effect of the Crimped-Paper Ends on Cartridges of Permissible Explosives in Propagating Detonation, by D. B. Gawthrop. 1932. 7 pp., 1 fig. Describes the halved-cartridge gap test by which is determined the sensitivity of explosives to detonation over an air gap. Gives results of tests of seven samples of similar components but varying physical character.
- RI 3192. Investigations During 1931 of Gases in Manholes in Boston, Mass., by G. W. Jones. 1932. 32 pp., 2 figs. Reports results of continued survey of explosion hazards in manholes, using specially designed test car and employing charcoal-filter test in addition to usual procedure. (See also RI 3109, 3213, 3260, 3305, 3321, 3375, 3433, and 3604.)
- RI 3193. Character of Drainage from Mines in the Thick Freeport Coal Bed, Pa., by R. D. Leitch, W. P. Yant, and R. R. Sayers. 1932. 29 pp., 1 fig. Gives character of samples of outflow and inside mine waters, with general information available.
- RI 3194. Inflammable Gases Produced by Thermal Decomposition of Plastic Insulators in an Electric Arc, by J. B. Littlefield and W. P. Yant. 1932. 7 pp., 2 figs. Describes insulating materials investigated and presents results of tests made in presence and in absence of oxygen.
- RI 3195. Selective Oiling and Table Concentration of Phosphatic Sands in Land-Pebble District of Florida, by R. G. O'Meara and J. W. Pamplin. 1932. 6 pp. Discusses briefly table concentration of material previously given a selective oil treatment. Laboratory and pilot-plant tests have shown this method to be successful when applied to underground phosphatic sands from land-pebble district of Florida.
- RI 3196. Compressed Air for Operating Modern Coal-Mining Equipment, by R. D. Currie. 1932. 14 pp., 7 figs. Describes conditions, compressed-air system and equipment, and costs at mine under discussion.
- †RI 3197. Composition of the Fractions of Primary and High-Temperature Tar, by E. B. Kester and W. D. Pohle. 1932. 11 pp., 3 figs. Reports results of pyrolysis of primary products of coal decomposition in high-temperature coking practice, both as to total quantities of chemically similar constituents and as to their distribution throughout boiling range.
- †RI 3199. A Study of Falls of Roof and Coal in Northern Colorado, by H. Tomlinson. 1933. 20 pp., 22 figs. Gives a general description of five mines in northern Colorado field, and discusses methods of roof support and types of accidents in those mines. Suggests remedies in practice to aid the prevention of falls.
- RI 3200. Washability Studies of Blue Creek Bed at Connellsville Mine, Connellsville, Ala., by B. W. Gandrud, A. C. Richardson, and W. G. Payne. 1933. 10 pp., 18 figs. Reports results of tests of coal from Blue Creek bed to determine washing characteristics and possibilities of reducing its ash content on coal-washing tables.
- RI 3201. Explosive Shattering of Minerals, by R. S. Dean and John Gross. 1933. 19 pp., 17 figs. Presents study of mechanism of shattering process and reports results obtained in tests on a selected group of ores.
- †RI 3203. Places of Occurrence of Injury from Falls of Roof, by J. W. Paul and D. L. Sibray. 1933. 13 pp., 3 figs. Shows by review of data on 80 mines that greatest percentage of accidents from roof falls occurs at working face. Enumerates practices which if followed would materially reduce such accidents.
- †RI 3204. Washability Studies of Mary Lee Bed at Powhatan Mine, Powhatan, Ala., by A. C. Richardson and W. H. Carrington. 1933. 15 pp., 26 figs. Gives results of tests to determine washing characteristics of coal from Mary Lee bed at Powhatan and shows how coal from top bench differs from rest. Presents data from which may be determined approximate extent of ash reduction obtainable on various sizes of run-of-mine coal.
- †RI 3205. The Development of an Electrolytic Method for the Determination of Inclusions in Plain Carbon Steels, by G. R. Fitterer, B. E. Sockman, E. A. Krockenberger, R. B. Meneilly, E. W. Marshall, Jr., and J. F. Eckel. 1933. 69 pp., 8 figs. Briefly describes electrolytic procedure for plain and low-carbon steels and gives results of work done in a study of factors affecting accuracy of electrolytic determinations, sources of contamination of electrolytic residue affecting analytical results, determination of manganese hydroxide precipitation by electrolysis of oxygen-free steels, determination of SiO₂, and extraction of alloy oxides and sulfides from alloy steels.
- †RI 3206. Washability Studies of Coal from the Mary Lee Bed at the Bankhead Mine, Bankhead, Ala., by A. C. Richardson and B. W. Gandrud. 1933. 9 pp., 3 figs. Contains results of screen-sizing and float-and-sink tests of a representative sample of run-of-mine coal and results of tests made to show amount of coal liberated from impurities by crushing the coarser sizes.
- †RI 3207. A Study of Falls of Roof and Coal, Rock Springs Coal District, Sweetwater County, Wyo., by H. Tomlinson. 1933. 23 pp., 9 figs. Third of series devoted to study of conditions influencing falls of roof and coal in western coal mines. Safety conditions in general are discussed and suggestions made for additional safeguards.
- †RI 3208. Review of Fatalities in the California Petroleum Industry during the Calendar Year 1932, by R. L. Marek. 1933. 21 pp., 1 fig. Reports accidents in various divisions of the industry and compares year's record with that of other years.
- †RI 3209. The Cleaning of Fine Coal from the Mary Lee Bed at the Porter Mine, by A. C. Richardson and B. W. Gandrud. 1933. 8 pp., 9 figs. Gives results of tests to determine washing characteristics of minus 3/16-inch raw coal and extent to which ash might be reduced by means of coal-washing tables.
- †RI 3210. Study of Properties of Texas-New Mexico Polyhalite Pertaining to the Extraction of Potash. VII. Effect of Particle Size, Sodium Chloride Concentration, and Temperature Upon Hot Extraction by a Multistage Process, by J. E. Conley and F. Fraas. 1933. 29 pp., 2 figs. Reports experiments performed to ascertain whether continuous countercurrent extraction of calcined polyhalite by hot water will yield satisfactory recoveries and concentrations of potassium sulfate in top liquor. Good results were obtained by minus 35-plus 100-mesh, minus 20-mesh, and minus 10-mesh sizes. (See also RI 3002, 3032, 3061, 3062, 3116, 3167, and 3237.)
- †RI 3211. A Study of Subsurface Pressures and Temperatures in Flowing Wells in the East Texas Field and Application of These Data to Reservoir and Vertical Flow Problems, by C. E. Reistle, Jr., and E. P. Hayes. 1933. 30 pp., 14 figs. Describes tests with pressure-temperature recording instruments and develops data to indicate sand performance and minimum reserve pressure necessary to produce the wells by natural flow through different sizes of tubing.
- †RI 3212. A Study of "Bottom-Hole" Samples of East Texas Crude Oil, by B. E. Lindsly. 1933. 22 pp., 7 figs. Describes "bottom-hole" sampling device and "flash" and differential methods of gas liberation from reservoir oil samples; also liquid compressibility tests. Concludes that East Texas oil is "undersaturated" and points out effects of solubility phenomena in that field.
- †RI 3213. Investigations During 1932 of Combustibles in Manholes in Boston, Mass., by G. W. Jones, John Campbell, and F. M. Goodwin. 1933. 17 pp., 1 fig.

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- Gives results of investigation to determine general hazards of combustible gases and vapors in man-holes and other underground openings and to develop methods of eliminating these hazards. (See also RI 3109, 3192, 3260, 3305, 3321, 3375, 3433, and 3604.)
- †RI 3214. Identification of Cerussite and Anglesite and Flotation with Galena, by F. D. DeVaney and R. E. Evans. 1933. 2 pp., 2 figs. Describes ore used in investigation and gives results of concentration, gravity concentration, and flotation tests.
- †RI 3215. Comparison of Methods for Determining Friability of Coal, by H. F. Yancey and R. E. Zane. 1933. 24 pp., 19 figs. Compares various methods previously brought forth for estimating friability of coal and coal products. Investigates relative friability of 4 sizes of 6 different coals as determined by 5 methods.
- †RI 3216. Limits of Inflammability of Natural Gases Containing High Percentages of Carbon Dioxide and Nitrogen, by G. W. Jones and R. E. Kennedy. 1933. 23 pp., 2 figs. Gives data obtained on extinction of propane and butane flames by addition of nitrogen and carbon dioxide. Contains curves and tables showing information enabling limits of inflammability of natural gases containing one or more constituents of methane, ethane, propane, and butane to be calculated.
- †RI 3217. Estimate of Gas Reserves of the Oklahoma City Oil Field, Oklahoma County, Okla., by H. B. Hill and E. L. Rawlins. 1933. 54 pp., 15 figs. Deals with geology of Oklahoma City field gas-producing horizons and gas reserves of Pennsylvanian formation, gas withdrawal in Pennsylvanian zone, reservoir conditions in pre-Pennsylvanian formations, and utilization of natural gas.
- †RI 3218. Volatilization of Impurities from Zinc Concentrates, by G. L. Oldright, W. E. Keck, and F. K. Shelton, with a section on Thermodynamic Calculations—Further Theoretical Study of the Separation of Cadmium and Zinc, by Chas. G. Maier. 1933. 51 pp., 5 figs. Discusses nature and analysis of zinc concentrates now made, new experiments on removal of lead and cadmium from zinc concentrate volatilization as oxides, and volatilization of cadmium from calcined zinc concentrate. Gives results of further critical studies of specific heats at low and high temperatures.
- †RI 3219. The National Safety Competition of 1932, by W. W. Adams. 1933. 17 pp. Gives names of companies that won trophies and those that received honorable mention for safety achievement. Reports accident data by types of mines and compares data for all groups.
- †RI 3221. Consumption Trends in the Roofing-Slate Industry, by Oliver Bowles. 1933. 3 pp., 3 figs. Influences that tend to dwarf long-established slate industry are analyzed briefly.
- †RI 3223. Progress Reports—Metallurgical Division. 1. Mineral Physics Studies, by R. S. Dean, V. H. Gottschalk, John Gross, J. Koster, C. W. Davis, and C. E. Wood. 1934. 37 pp., 21 figs. Includes the following five reports: Magnetic Separation of Minerals; Deformation of Solids; Progress in Explosive Shattering; Measurement of Crushing Resistance of Minerals by the Scleroscope; and Preliminary Report on Dust Settling. (See also RI 3268, 3400, and 3570.)
- †RI 3224. Classification and Tabling of Alabama Red Iron Ores, by B. W. Gandrud, A. C. Richardson, and B. S. Followill. 1934. 8 pp., 1 fig. Proposes simple flow sheet using only standard methods of gravity concentration for low-grade Alabama red iron ores. Method is believed to be more economical than any process proposed heretofore.
- †RI 3225. The Flotation of Alabama Graphite Ores, by C. W. Gandrud, G. D. Coe, C. S. Benefield, and I. N. Skelton. 1934. 20 pp. Describes results of investigation undertaken to develop concentrating process capable of recovering at low cost maximum amount of graphite meeting requirements for manufacture of dry batteries.
- †RI 3226. Progress Reports—Metallurgical Division. 2. Gold Recovery Studies, by E. S. Leaver, J. A. Woolf, and R. E. Head. 1934. 31 pp. Embodies four papers, as follows: Recovery of Refractory Gold in Milling Ores; Flotation of Metallic Gold—Relation of Particle Size to Floatability; Depressing Primary Slime During the Flotation of Gold in Milling Ores; and Form and Occurrence of Gold in Pyrite from a Metallurgical Viewpoint. (See also RI 3275.)
- †RI 3227. Trade Trends in the Lime Industry, by Paul Hatmaker. 1934. 18 pp., 13 figs. Presents what is believed to be first attempt to correlate many business data on current markets for lime.
- †RI 3228. Progress Reports—Metallurgical Division. 3. Studies in the Metallurgy of Copper, by R. S. Dean, F. S. Wartman, A. J. Thompson, E. K. Pryor, J. D. Sullivan, G. L. Oldright, A. F. Hallet, S. L. Brown, W. A. Sloan, and C. W. Davis. 1934. 57 pp. Includes chapters on Outlook for Profitable Research in the Metallurgy of Copper; Preparation and Properties of Copper Ferrite; Leaching Copper Ores—Study of Oxidation of Iron Solutions Used as a Solvent; Regeneration of Ferric Sulfate in Copper-Leaching Solutions; Hydrometallurgy of Copper Sulfide Ores and Its Relation to Mineral Structure; and Comparison of Western Methods for Determination of Oxidized Copper in Ores. (See also RI 3340.)
- †RI 3229. Progress Reports—Metallurgical Division. 4. Studies in Direct Production of Iron and Steel from Ore, by R. S. Dean, S. R. B. Cooke, John Gross, C. W. Davis, C. G. Maier, S. B. Thomas, E. P. Barrett, T. L. Joseph, C. E. Wood, G. R. Fitterer, H. Freeman, V. H. Gottschalk, and Donald Doan. 1934. 65 pp., 55 figs. Includes reports on Amenability of Various Iron Ores to Rigorous Concentration; Explosion Shattering of Iron Ores; Alternating-Current Magnetic Separation of Iron Ores; Methods of Reducing Pure Iron Ore; Nitrogen Content of Sponge Iron and of Metal Obtained by Melting Sponge Iron; Use of Sponge Iron in the Production of High-Quality Steels in the Electric Arc Furnace; and Study of Reduced Ferberite as a Substitute for Ferrotungsten.
- †RI 3230. Solubility of Carbon in Iron-Manganese-Silicon Alloys, by C. H. Herty, Jr., and M. B. Royer. 1934. 22 pp., 6 figs. Describes work done to supply definite information as to which composition of manganese and silicon within a certain manganese-silicon ratio and when alloyed with iron would have an allowable carbon content for particular type of steel on which deoxidizer is used.
- RI 3231. Dry Cells and Their Application to Mining, by A. B. Hooker and E. J. Coggeshall. 1934. 8 pp. Discusses application of dry cells in four fields of electric shot firing, auxiliary lighting, signaling, and testing.
- †RI 3232. Temperature-Viscosity Measurements in the System CaO-SiO_2 and $\text{CaO-SiO}_2\text{-CaF}_2$, by C. H. Herty, Jr., F. A. Hartgen, G. L. Frear, and M. B. Royer. 1934. 31 pp., 17 figs. Describes construction and results obtained with viscometer, apparatus for determination of viscosity of high-melting materials at temperatures corresponding to those in pig iron and steel making.
- †RI 3233. The Occurrence of Gases in Coals, by R. F. Selden. 1934. 64 pp., 2 figs. Reviews recent literature on occurrence of gas in coals and discusses present status of situation critically.

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- †RI 3234. Table Cleaning of Fine Coal from the Thompson and Woodstock Beds of the Cahaba Field, Alabama, by A. C. Richardson, B. W. Gandrud, and W. D. Musgrove. 1934. 19 pp., 28 figs. Describes investigation to determine influence of rash upon efficiency of coal-washing tables. Results indicate that when table is operated correctly there is little difficulty in eliminating rash and that trouble is due mainly to bony impurities in material finer than 100-mesh.
- †RI 3235. Some Physical Properties and Characteristics of Fuse, by N. A. Tolch and J. E. Tiffany. 1934. 21 pp., 2 figs. Presents results of survey of properties and characteristics of brands of fuse manufactured in United States; 25 samples were procured from 4 manufacturers, representing all brands on the market when investigation was begun.
- †RI 3236. Detailed Statistical Microscopic Analyses of the Ores and Mill Products of the Silver King Flotation Concentrator, Park City, Utah, by R. E. Head, A. L. Crawford, F. E. Thackwell, and G. Burgener. 1934. 70 pp., 9 figs. Gives eight groups of analyses of lead concentrate, zinc concentrate, and tailings from Silver King mill, with illustrative graphs. (See also TP 533 and RI 3286 and 3290.)
- †RI 3237. A Study of the Properties of Texas-New Mexico Polyhalite Relating to the Extraction of Potash. VIII. Removal of Sodium Chloride from Crude Polyhalite by Washing, by J. M. Davidson and F. Fraas. 1934. 25 pp., 6 figs. Small-scale engineering tests have demonstrated that sodium chloride content may be reduced to as low as 1 percent with a loss under 5 pounds of K_2SO_4 per 100 pounds of sodium chloride removed when diluted waste liquors containing about 1 gram of sulfate and 8 grams of $MgSO_4$ per 100 grams of water are used as washing medium. (See also RI 3002, 3082, 3061, 3062, 3116, 3167, and 3210.)
- †RI 3238. Summary of Experimental Data on Laboratory Oxidation of Crude Oils, with Particular Reference to Air Repressuring, by Sam S. Taylor and H. M. Smith. 11 pp. 1934. Gives results of study of air-repressuring problems through laboratory-scale investigation of direct oxidation of crude oil.
- †RI 3239. Progress Reports—Metallurgical Division. 5. Ore-Dressing Studies. Grinding Tests for Easy Interpretation of Results, by W. H. Coghill and F. D. DeVaney. Flotation and Depression of Nonsulfides; Calcite, Silica and Silicates, Fluorspar, Barite, Apatite, and Tungsten Minerals, by J. Bruce Clemmer and R. G. O'Meara. 1934. 26 pp., 1 fig. Includes reports on grinding tests for easy interpretation of results and flotation and depression of nonsulfides—calcite, silica and silicates, fluorspar, barite, apatite, and tungsten minerals. (See also RI 3333, 3437, and 3469R.)
- †RI 3240. Progress Reports—Metallurgical Division. 6. Size Preparation of Iron Ores and Desulfurization Studies, by T. L. Joseph and W. F. Holbrook. 1934. 25 pp., 10 figs. Includes results of reduction tests on sinters and artificial fayalite and tests on the desulfurizing action of manganese and slag.
- †RI 3241. Formulas for Designing Natural-Gas Pipe-Line Systems Consisting of Parallel Lines, by T. W. Johnson and W. B. Berwald. 1934. 11 pp., 1 fig. Deals with part of study during past several years of flow of natural gas through high-pressure pipe lines, and involves investigation of design of pipe-line systems consisting of lines laid parallel to each other.
- †RI 3242. Progress Reports—Metallurgical Division. 7. Studies in Lead Metallurgy; Résumé on Smelting in the Lead Blast Furnace—Handling Zinciferous Charges, by G. L. Oldright and Virgil Miller. 1934. 11 pp. Summarizes data given in five papers describing operations at large smelter at Trail, British Columbia, equipped to produce electrolytic zinc, lead, copper, silver, bismuth, cadmium, sulfuric acid, and commercial fertilizers.
- †RI 3243. Smelting in the Lead Blast Furnace. Handling Zinciferous Charges. XI. Preparation of the Charge by Sintering, by G. L. Oldright and Virgil Miller. 1934. 60 pp., 4 figs. Covers operations at plant of Consolidated Mining & Smelting Co. of Canada, Ltd., Trail, B. C., the third important smelter to be described in this series; other papers covering various phases of smelting practice at this plant will follow. Interesting feature is production of chemicals, chiefly agricultural fertilizers, marking an epoch in mining industry. (See also RI 2954, 2957, 2963, 2965, 2966, 3088, 3094-3096, 3183, 3244-3246, and 3264.)
- †RI 3244. Smelting in the Lead Blast Furnace. Handling Zinciferous Charges. XII. The Gases Within the Blast Furnace at Top and Tuyères, by G. L. Oldright and Virgil Miller. 1934. 22 pp., 1 fig. Deals with gases evolved in smelting a charge containing large proportion of zinc. (See also RI 3243.)
- †RI 3245. Smelting in the Lead Blast Furnace. Handling Zinciferous Charges. XIII. Accretions at Various Elevations Within the Blast Furnace, and Factors Governing the Manner and Rate of Descent of the Stock Column, by G. L. Oldright and Virgil Miller. 1934. 15 pp. Includes measurements of rate of descent of charge, study of accretions in shaft of furnace, discussion of removal of accretions from walls of furnace, and information regarding accretions in crucibles. (See also RI 3243.)
- †RI 3246. Smelting in the Lead Blast Furnace. Handling Zinciferous Charges. XIV. Methods of Charging the Blast Furnace; Their Effect on Furnace Operation, by G. L. Oldright and Virgil Miller. 1934. 12 pp., 7 figs. Outlines study of blast-furnace gases at Trail, B. C., which indicates that various ingredients in stock column segregate themselves into vertical zones. Practice was studied in detail. (See also RI 3243.)
- †RI 3247. Beneficiating Cement Raw Materials by Agglomeration and Tabling, by F. P. Diener, J. Bruce Clemmer, and S. R. B. Cooke. 1935. 6 pp. Presents results of study of problem of separating flint from cherty limestone by agglomeration and tabling, thus permitting use of material hitherto wasted and increasing amount of rock economically available.
- †RI 3248. Dewatering Clay Suspensions by Spray Evaporation, by Hewitt Wilson, George A. Page, and Vance S. Cartwright. 1935. 42 pp., 25 figs. Reviews commercial practice with spray evaporators for miscellaneous products; considers capacity of disk rotors, velocity of clay particles falling in air, and heat and air necessary for evaporation; and gives experimental work with laboratory evaporators using atomizers and sprayers.
- †RI 3249. Chemical Method for Removing Mud Sheaths in Oil Wells, by H. C. Miller and G. B. Shea. 1934. 19 pp., 3 figs. Outlines procedure and results of laboratory investigation of chemical method for removing mud sheaths in oil wells.
- †RI 3250. A Thermal Conductivity Apparatus for Continuous Determination of the Helium Content of Natural Gas, by Allen S. Smith. 1934. 11 pp., 4 figs. Describes apparatus used at Bureau's helium plant, Amarillo, Tex., in determining helium content of natural gas after it has been processed.
- †RI 3251. Engineering Studies and Results of Acid Treatment of Wells, Zwolle Oil Field, Sabine Parish, La., by R. E. Heithecker. 1934. 35 pp., 14 figs. Gives results of study undertaken by Bureau of Mines in June 1930 at request of operators and Louisiana Department of Conservation. Discusses results of investigation in field where oil horizons are marl and chalk rock. Unusually detailed cross sections of wells are given.
- †RI 3252. Tabulated Analyses of Texas Crude Oils, by Gustav Wade, 1934. 40 pp., 1 fig. Assembles all anal-

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- yses made by Bureau of Mines on Texas oils, grouped by fields. (See also TP 607.)
- †RI 3253. Analyses of Crude Oils from Some Fields of Southern Louisiana, by A. J. Kraemer and E. L. Garton. 1934. 36 pp. Gives analyses of 26 representative crude oils from various producing formations of southern Louisiana. (See also RI 3476 and 4034.)
- †RI 3254. The National Safety Competition of 1933, by W. W. Adams. 1934. 18 pp. States basis for award of trophies in 1933 contest, with records of all companies that participated (332 mines and quarries in 35 States). In all, 73 of the mines and quarries operated with no lost-time accidents.
- †RI 3255. Lag, Spread, and Sustained Ignition in Electric Detonators, by A. B. Hooker and E. J. Coggeshall. 1934. 9 pp., 9 figs. Covers results of tests to determine the lag, spread, and sustained-ignition characteristics of seven regular makes of electric detonators, also to determine the timing of a multiple-shot, generator-type blasting unit.
- †RI 3256. Progress Reports—Metallurgical Division. 8. Studies in Zinc Metallurgy, by H. A. Doerner, G. L. Oldright, Thomas B. Brighton, and Carl L. Dice. 1934. 43 pp., 21 figs. Includes two papers, the first on reduction of zinc ores by natural gas, and the second on the recovery of zinc from ferrite compounds in the electrolytic zinc process.
- †RI 3257. Production of Explosives in the United States During the Calendar Year 1933, by W. W. Adams, E. V. Walters, and V. E. Erwin. 1934. 12 pp. Gives statistical data on annual production of explosives in the United States. Ordinarily issued as a technical paper.
- †RI 3258. Isolation and Study of the Humic Acids from Peat, by Chester L. Arnold, Alexander Lowy, and Reinhardt Thiessen. 1934. 9 pp., 1 fig. Presents results of study of peat from Hawk Island Swamp, Manitowoc County, Wis., which involved an attempt to remove, without drastic action, many contaminating substances before humic acids were isolated and to separate latter unchanged so as to avoid impurities.
- †RI 3260. Investigations During 1933 of Combustibles in Manholes in Boston, Mass., by G. W. Jones, John Campbell, and F. M. Goodwin. 1934. 25 pp. Gives results of investigation to determine general hazard of combustible gases and vapors in manholes and other underground openings. (See also RI 3109, 3192, 3213, 3305, 3321, 3375, 3433, and 3604.)
- †RI 3261. Use of Rock Dust in Bituminous-Coal Mines During 1930, 1931, and 1932 (a Statistical Survey), by W. W. Adams. 1934. 9 pp., 4 figs. A survey conducted by the Demographical Division, Bureau of Mines, and based upon reports from operating companies.
- RI 3262. Progress Reports—Metallurgical Division. 9. Thermodynamic Data on Some Metallurgically Important Compounds of Lead and the Antimony-Group Metals and Their Application, by Charles G. Maier. 1934. 54 pp. Presents assembled data on thermodynamic calculations of compounds of lead and antimony, which, it is hoped, will answer certain practical problems presented by operating metallurgists.
- †RI 3263. Froth Flotation of Coal; Sulfur and Ash Reduction, by H. F. Yancey and J. A. Taylor. 1934. 20 pp., 4 figs. Describes application to treatment of coal of method ordinarily used in ore dressing.
- †RI 3264. Smelting in the Lead Blast Furnace. Handling Zinciferous Charges. XV. Slags from the Trail Blast Furnace, by G. L. Oldright and Virgil Miller. 1934. 19 pp. The last of a group of papers on operation at a large blast furnace in British Columbia which manufactures chemicals and fertilizers as byproducts. Conclusions are reached that highly zinciferous charges may be smelted with small amount of coke and at a rate comparable to that obtained in excellent practice with charges commonly considered easily smelted and that highly zinciferous slags rather than barren diluents are more profitable where such slag may be soon treated to recover both lead and zinc. (See also RI 2954, 2957, 2963, 2965, 2966, 3038, 3094-3096, 3183, and 3243-3246.)
- †RI 3265. Assay of Black Sands, by Paul Hopkins. 1934. 5 pp. Reports findings of several methods of assaying placer concentrates.
- †RI 3266. Recent Trends in Man-Hour Production at Iron-Ore Mines, by H. W. Davis, W. W. Adams, and O. E. Kiessling. 1935. 6 pp., 3 figs. Correlates data on hours of labor and other detailed employment information with statistics on production reported annually by producers.
- †RI 3267. Bumps in Coal Mines of the Cumberland Field, Kentucky and Virginia—Causes and Remedy, by George S. Rice. 1935. 36 pp., 12 figs. Describes geological and mining conditions in field, reviews history of some of most disastrous bumps, and suggests procedure that may take stresses off pillars and help to avoid further catastrophes.
- †RI 3268. Progress Reports—Metallurgical Division. 10. Mineral Physics Studies, by R. S. Dean, John Gross, C. E. Wood, John Koster, V. H. Gottschalk, F. S. Wartman, and C. W. Davis. 1935. 107 pp., 49 figs. Embodies papers on applied mineral physics, including explosive shattering, electrical properties of mineral aggregates, apparatus for determining the magnetic constants of mineral powders, magnetization curves for magnetite powders, coercive force, magnetic properties of mineral powders, and practical aspects of alternating-current magnetic separation. (See also RI 3223, 3400, and 3570.)
- RI 3269. Special Multiple-Shot Blasting Units, by A. B. Hooker and E. J. Coggeshall. 1935. 10 pp., 5 figs. Concludes that safety from electric ignition of gas when multiple shots are fired with generator-type units is obtainable not by using units that will not produce igniting sparks but by having the firing circuit dead before disturbance at the face occurs.
- †RI 3270. Survey of Fuel Consumption at Refineries in 1933, by G. R. Hopkins. 1935. 6 pp., 2 figs. Gives consumption of various refinery fuels by kinds and districts.
- †RI 3271. Concentration of the Potash Ores of Carlsbad, N. Mex., by Ore-Dressing Methods, by Will H. Coghill, F. D. DeVaney, J. B. Clemmer, and S. R. B. Cooke. 1935. 13 pp., 1 fig. Describes experiments conducted at the Bureau's Mississippi Valley Experiment Station, in which it was found that by maintaining a closed circuit of brine saturated with the constituents of the ore, the sylvinite ores of Carlsbad, N. Mex., may be concentrated by ore-dressing methods. Any one of three procedures will yield high-grade concentrates and high recoveries.
- †RI 3272. Effect of Soot on Heat Transmission in Small Boilers, by P. Nicholls and C. E. Augustine. 1935. 14 pp., 2 figs. Gives results of study of small boilers operating at low rates of burning to determine the reduction in efficiency resulting from the insulating effect of deposits of soot. Investigation shows that soot deposits decreased the heat absorbed by the boilers 2 to 7 percent, depending on the thickness of the deposits, instead of the large proportionate decrease (sometimes as high as 50 percent) suggested in statements previously issued.
- †RI 3273. Coke-Oven Accidents in the United States During the Calendar Year 1933, by W. W. Adams and V. E. Erwin. 1935. 15 pp., 1 fig.
- RI 3274. Accuracy of Manometry of Explosions: General Survey of the Problem and Comparison of Piston-Type with Diaphragm-Type Manometers, by H. F. Coward and M. D. Hersey. 1935. 39 pp., 18 figs. Gives general outline of problem, classifies various

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- types of explosion manometers, and gives results of tests comparing six manometers of piston and diaphragm type.
- RI 3275. Progress Reports—Metallurgical Division. 11. Studies on the Recovery of Gold and Silver, by E. S. Leaver, M. B. Boyer, J. A. Woolf, R. E. Head, B. W. Gandrud, R. E. Evans, and F. W. Thackwell. 1935. 65 pp., 10 figs. Includes papers on amalgamation and cyanidation; amalgamation during fine grinding of gold ores; flotation of gold; effect of sodium sulfide; form and occurrence of gold in pyrite from a metallurgical standpoint—coated gold; investigations on southern gold ores; auriferous black sand of the Pacific coast; floatability of lead and silver jarosites. (See also RI 3226, 3436, and 3661.)
- RI 3276. A Detector for Quantitative Estimation of Low Concentrations of Hydrogen Sulfide, by J. B. Littlefield, W. P. Yant, and L. B. Berger. 1935. 13 pp., 1 fig. Describes especially hydrogen sulfide detector based on color-change reaction on surface of sensitized granules placed in glass tube through which atmosphere to be examined is aspirated with a rubber bulb or hand pump. Method is especially adapted to use by nontechnical men in industry or the field.
- †RI 3277. The National Safety Competition of 1934, by W. W. Adams and T. D. Lawrence. 1935. 20 pp. Names winners and reviews records achieved in five classes of mineral establishments in 1934—anthracite mines, bituminous-coal mines, metal mines, non-metallic mines, and open-cut mines and quarries. Winners are awarded trophy "Sentinels of Safety."
- †RI 3278. Limits of Inflammability of Diethyl Ether and Ethylene in Air and Oxygen, by G. W. Jones, W. P. Yant, W. E. Miller, and R. E. Kennedy. 1935. 5 pp. Determines widest limits of inflammability in two designs of test apparatus. Describes apparatus and experimental procedures and cites references.
- RI 3279. "Base" of a Crude Oil, by E. C. Lane and E. L. Garton. 1935. 12 pp. Defines the seven "bases" of crude petroleum and gives illustrative Hempel analyses.
- †RI 3281. Survey of Fuel Consumption at Refineries in 1934, by G. R. Hopkins. 1935. 5 pp., 2 figs. Annual review of fuel consumption for past calendar year.
- †RI 3282. A Procedure for the Removal and Determination of Small Amounts of Benzene in Biological Material, by W. P. Yant, H. H. Schrenk, and P. H. Mautz. 1935. 7 pp., 1 fig. Describes method for removal and determination of small amounts of benzene present in tissues or excretions after exposure to conditions that ultimately will produce chronic benzene poisoning.
- RI 3283. Quality of Anthracite as Prepared at Breakers Operated by Members of the Anthracite Institute in 1935. 1935. 2 pp. Gives weighted average analyses, by sizes, of 268 samples of anthracite taken from collieries in Pennsylvania during February, March, and April 1935.
- †RI 3284. The Ignition Temperature of Diethyl Ether and Ethylene in Air and Oxygen, by G. W. Jones, W. P. Yant, W. E. Miller, and R. E. Kennedy. 1935. 6 pp., 2 figs. Describes determination of diethyl ether and ethylene in air and oxygen primarily for comparison with similar determinations of other compounds in the same apparatus, using same laboratory technic.
- †RI 3285. Production of Explosives in the United States During the Calendar Year 1934, by W. W. Adams and V. E. Erwin. 1935. 12 pp., 2 figs. Gives statistics on output of explosives by kinds and by consuming industries.
- RI 3287. A Microcolorimetric Method for the Determination of Benzene, by H. H. Schrenk, S. J. Pearce, and W. P. Yant. 1935. 11 pp., 1 fig. Describes method used to fill need for simple, accurate determination of benzene vapor in air; it is suitable for making industrial hygiene surveys.
- †RI 3288. Detailed Statistical Microscopic Analyses of Ore and Mill Products of the Utah Copper Co., by R. E. Head, A. L. Crawford, F. E. Thackwell, and Glen Burgener. 1935. 93 pp., 18 figs. Presents and analyzes 16 groups of tables of microscopic analyses on products of two mills (Arthur and Magna) of Utah Copper Co. Gives additional data on plant records from 1910 to 1931, and analyzes constituents of ore. (See also TP 533 and RI 3236 and 3290.)
- RI 3289. The Microprojector for Determining Particle-Size Distribution and Number Concentration of Atmospheric Dust, by Carlton E. Brown and William P. Yant. 1935. 8 pp., 3 figs. Describes apparatus and methods for examining samples of atmospheric dust by projecting images of the dust particles at a high known magnification onto a ruled translucent screen. Determination can be made with less eye strain, time, and effort than by direct visual microscopic methods.
- †RI 3290. Statistical Microscopic Study of Ores and Mill Products from the Anyox Plant of the Granby Consolidated Mining, Smelting & Power Co., Ltd., Anyox, British Columbia, by R. E. Head, Arthur L. Crawford, F. E. Thackwell, and A. Lee Christensen. 1935. 18 pp., 11 figs. The fourth of a series of careful microscopic studies of samples from representative milling operations; approximately 150,000 particles were examined and measured. The entire copper content of the ore concerned is present in chalcopyrite. (See also TP 533 and RI 3236 and 3288.)
- †RI 3291. Bureau of Mines Multiple-Diaphragm Recording Subsurface-Pressure Gage, by W. B. Berwald, H. A. Buss, and C. E. Reistle, Jr. 1935. 19 pp., 16 figs. Describes instrument devised by Bureau of Mines petroleum engineers for measurement of subsurface pressures.
- †RI 3292. Factors That Decrease the Light of Electric Cap Lamps, by A. B. Hooker and D. H. Zellers. 1935. 10 pp. Tells users of electric cap lamps that to get greatest available efficiency servicing instructions provided by the manufacturer should be followed. These include daily inspection of lamps to observe defects that may impair their usefulness and monthly photometric inspection of specimen lamps.
- †RI 3293. Benzene in Natural Gas, by H. H. Schrenk, W. P. Yant, and S. J. Pearce. 1935. 2 pp. Describes results of colorimetric method devised by the authors for determining benzene, in the course of which it was found that benzene does occur in natural gas, an interesting discovery.
- †RI 3294. A Study of the Occurrence and Amenability to Leaching of the Phosphorus Compounds in Some Red Iron Ores of Alabama, by Ellis S. Hertzog. 1935. 9 pp. Suggests use of leaching to remove phosphorus from Alabama iron ores, inasmuch as gravity concentration has proved of little value.
- †RI 3295. Rock Dust in Bituminous-Coal Mines During 1930-33, by W. W. Adams, L. E. Geyer, and M. G. Parry. 1935. 7 pp., 4 figs. Presents data in same form as in RI 3261. Summarizes reports for 382 mines in 1933, with total production of 96,691,753 tons of bituminous coal.
- RI 3296R. Classification Chart of Typical Coals of the United States (Showing B. t. u. per Pound on the Moist, Mineral-Matter-Free Basis, Plotted Against Fixed Carbon on the Dry, Mineral-Matter-Free Basis), by A. C. Fieldner, W. A. Selvig, and W. H. Frederic. 1939. 22 pp., 4 figs. (Revised.) Gives specifications for classification of coals by rank, with charts showing the B. t. u. of typical coals of the United States, as well as a list of 316 coal samples given in the charts and their source and rank.
- †RI 3297. Preliminary Report of the Disposal of Oil-Field Brines in the Ritz-Canton Field, McPherson County, Kans., by C. J. Wilhelm and Ludwig

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- Schmidt. 1935. 20 pp., 6 figs. Gives survey of quantity of brine produced and method in use at time in disposing of brine and efficiency of these methods in preventing mineralization of fresh-water-bearing formations and surface streams.
- †RI 3298. Charts for Determining the Performance of Centrifugal Fans, by G. E. McKelroy. 1936. 30 pp., 35 figs. Presents types of charts adapted to aid in graphic solution of fan-performance problems of selection and operation.
- †RI 3299. Anhydrous Sodium Sulfate from Saline Deposits or Brines by a Four-Stage Process, by J. E. Conley and E. P. Partridge. 1936. 18 pp., 5 figs. Discusses feasibility of recovering or producing anhydrous sodium sulfate from plant-waste liquors or from natural brines of suitable composition. Expansion of the kraft-paper industry has brought about a larger demand for sodium sulfate, which the process described may help to supply.
- †RI 3300. Flotation of Langbeinite from the Potash Field of New Mexico and Texas, by F. D. DeVaney and S. R. B. Cooke. 1936. 4 pp. Demonstrates ease and speed with which langbeinite may be treated by flotation, using same type of collectors as in separation of sylvite to separate it from halite and using saturated brine as flotation medium.
- †RI 3301. Check Determination of Grindability of Coal by Various Methods, by W. A. Selvig. 1936. 16 pp. Describes tests conducted under Subcommittee on Coal and Coke of American Society for Testing Materials with a view to evaluating various laboratory procedures for testing grindability of coal.
- †RI 3302. Microcolorimetric Determination of Benzene in Blood and Urine, by S. J. Pearce, H. H. Schrenk, and W. P. Yant. 1936. 8 pp., 2 figs. Attempts to fill need for simple, very sensitive, accurate method for determination of benzene in blood and urine evident throughout recent study of chronic benzene poisoning.
- RI 3303. Comparison of Output and Intake Characteristics of Natural-Gas Wells in the Texas Panhandle Field, by M. A. Schellhardt and E. L. Rawlins. 1936. 25 pp., 11 figs. Gives results of study in Texas Panhandle field during past several years to determine delivery capacities of wells under different pressure and operating conditions and to determine relationships between pressures and rates of delivery from gas wells.
- RI 3304. Permissible Electric Mine Lamps (Supplement to Bulletin 332), by L. C. Iisley and A. B. Hooker. 1936. 11 pp. Covers electric cap lamps, electric hand lamps, and lamps for miscellaneous uses approved between May 1930 and July 1935. New types include a portable floor lamp for throwing direct light on working face, semiportable lamp for room lighting applicable where compressed-air supply is available, animal lamp for attachment to collar of horse or mule, and dry-cell-type signal lamp especially useful in mines where battery-charging facilities are not available.
- †RI 3305. Investigations During 1934 of Combustibles in Manholes in Boston, Mass., by G. W. Jones, John Campbell, F. M. Goodwin, and W. P. Yant. 1936. 14 pp., 1 fig. Continues series of investigations of manholes in Boston and vicinity. Describes and tabulates results of tests of manholes owned by Edison Electric Illuminating Co. and New England Telephone and Telegraph Co. (See also RI 3109, 3192, 3213, 3260, 3321, 3375, 3433, and 3604.)
- †RI 3306. Progress Reports—Metallurgical Division. 12. Annual Report of the Metallurgical Division, Fiscal Year 1935, by R. S. Dean. 1936. 39 pp., 7 figs. Describes work done by each of the sections of the division during past fiscal year. These sections are: Metallurgical fundamentals, special studies, copper metallurgy, ore dressing, precious metals, lead and zinc, and iron and steel.
- †RI 3307. Ventilation of Manholes. I. Effect of Holes in Covers on Natural Ventilation, by G. W. Jones, W. E. Miller, John Campbell, and W. P. Yant. 1936. 5 pp., 2 figs. Continues study of manholes, various phases of which have already been described in Reports of Investigations 3109, 3192, 3213, 3260, and 3305. (See also RI 3343, 3412, and 3496.)
- †RI 3308. The National Safety Competition of 1935, by W. W. Adams, T. D. Lawrence, and D. R. White. 1936. 20 pp. Names winners and reviews records achieved in five classes of mineral establishments in 1935—anthracite mines, bituminous-coal mines, metal mines, nonmetal mines, and open-cut mines and quarries. Winners are awarded trophy, "Sentinels of Safety."
- RI 3309. Permissible Electrically Operated Air Compressors, by L. C. Iisley, E. J. Gleim, and H. B. Brunot. 1936. 18 pp., 3 figs. Describes in detail features of air compressors approved by the Bureau of Mines as "permissible." These include the Sullivan Machinery Co. type WK-26 compressor, the Sullivan Machinery Co. type WK-39 compressor, the General Electric Co. types CP-26D, G, and E compressors, the Ingersoll-Rand type 20 compressor, and the Sullivan Machinery Co. type WK-22 compressor.
- †RI 3310. Extraction Methods for Determining Tar Acids and Bases, and Variables Affecting Their Accuracy, by C. H. Fisher and Abner Eisner. 1936. 34 pp., 1 fig. Studies and compares several modifications of contraction method of analyzing tar oils and shows general conditions under which tar acids and bases can be extracted accurately.
- †RI 3311. Cooperative Fuel Research Motor-Gasoline Survey, Winter 1935-36, compiled by E. C. Lane and A. J. Kraemer. 1936. 63 pp. First publication in proposed series of reports on properties of commercial motor fuels. Gives results of analyses in oil-company laboratories of gasoline samples obtained from service-station pumps in 18 marketing areas.
- RI 3312. The Improved Permissible Flame Safety Lamps, by L. C. Iisley, A. B. Hooker, and E. J. Coggeshall. 1936. 10 pp., 2 figs. Describes improvements made by Bureau engineers on flame safety lamps, which make them effective and easily used in dim light and by persons without keen eyesight.
- †RI 3313. Extent and Availability of Natural-Gas Reserves in Michigan "Stray" Sandstone Horizon of Central Michigan, by E. L. Rawlins and M. A. Schellhardt. 1936. 139 pp., 16 figs. Describes work done at request of Department of Conservation, State of Michigan, in estimating reserves of natural gas in central Michigan. Estimates total proved and semi-proved reserves at 28,200,000,000 cubic feet, of which about 6,000,000,000 cubic feet have already been withdrawn. (Printed by the Michigan Department of Conservation in cooperation with the Michigan Public Utilities Commission.)
- †RI 3314. Flotation of Vermont Talc-Magnesite Ores, by J. Bruce Clemmer and S. R. B. Cooke. 1936. 12 pp. Talc concentrates and tailings rich in magnesite were obtained in experimental concentration of Vermont talc-magnesite ores. Magnesite is considered in report because of possible market value.
- RI 3315. Washability Studies of Coal from the Henry Ellen Bed at Acmar No. 5 Mine, Acmar, Ala., by B. W. Gandrud and G. D. Coe. 1936. 23 pp., 21 figs. One of a series of reports of investigations describing results of washability studies of coal from commercially important beds of Alabama.
- †RI 3316. Petroleum Engineering Report: Big Spring Field and Other Fields in West Texas and Southeastern New Mexico, by Charles B. Carpenter and H. B. Hill. 1936. 223 pp., 40 figs. Gives geology and production history of East and West pools, Howard and Glasscock Counties; Yates oil field, Pecos Coun-

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- ty; Hendrick oil field, Winkler County; Church-Fields-McElroy oil field, Crane and Upton Counties; Big Lake oil field, Reagan County; Penn oil field, Ector County; and Westbrook oil field, Mitchell County—all in Texas. Also gives similar data for Hobbs oil field, Lea County, N. Mex.
- †RI 3317. Production of Explosives in the United States During the Calendar Year 1935, by W. W. Adams and V. E. Wrenn. 1936. 13 pp., 2 figs. Gives data showing that 308,381,250 pounds of explosives were produced in 1935, 2 percent less than in 1934.
- †RI 3318. Disposal of Oil-Field Brines in the Arkansas River Drainage Area in Western Kansas, by C. J. Wilhelm, H. M. Thorne, and M. F. Pryor. 1936. 28 pp. Presents the results of a study of the oil-producing fields within the Arkansas River drainage area west of Hutchinson, Kans., with reference to the disposal of oil-field brines.
- †RI 3319. Earth Vibrations Caused by Quarry Blasting, by F. W. Lee, J. R. Thoenen, and S. L. Windes. 1936. 19 pp., 11 figs. Gives results of investigation made possible by cooperation of seven New England quarries. Includes bibliography of other work on same subject. (See also RI 3353, 3407, 3431, and 3542.)
- †RI 3320. Diesel Mine Locomotives—Development and Use in European Coal Mines, by George S. Rice and F. E. Harris. 1936. 52 pp. Describes use of and experience with Diesel locomotives in Germany, Belgium, France, and Great Britain. Summarizes reasons why Diesel locomotives have not been adopted in this country and points out their advantages.
- †RI 3321. Investigations During 1935 of Combustibles in Manholes in Boston, Mass., by G. W. Jones, John Campbell, F. M. Goodwin, and W. J. Huff. 1936. 19 pp. Annual report of investigations conducted in Boston in cooperation with Edison Electric Illuminating Co. of Boston and Boston Consolidated Gas Co. Reduction in amount of combustibles discovered has occurred steadily since work was initiated. (See also RI 3109, 3192, 3213, 3260, 3305, 3375, 3433, and 3604.)
- †RI 3322. Metallurgical Division—Progress Reports. 13. Electrometallurgical Investigations. Studies on the Treatment of Domestic Chrome Ores, by J. Koster. Electrolysis of Manganese Solutions, by S. M. Shelton. Electrometallurgical Studies on the Treatment of Alunite, by R. G. Knickerbrocker and J. Koster. 1936. 64 pp., 4 figs. Reviews work of electrometallurgical section for fiscal year 1936; describes process for continuous electrolysis of manganese that offers potential use for extensive deposits of domestic manganese-bearing ores. (Other progress reports of electrometallurgical series are RI 3406, 3438, 3483, 3491, and 3500.)
- †RI 3323. A Microcolorimetric Method for the Determination of Toluene, by W. P. Yant, S. J. Pearce, and H. H. Schrenk. 1936. 12 pp., 2 figs. Describes a method to determine small quantities of toluene that was developed recently by the Bureau of Mines at its Pittsburgh experiment station.
- †RI 3324. Active List of Permissible Explosives and Blasting Devices Approved Prior to July 31, 1936. 20 pp. Gives changes in list during last year. Lists characteristics of 170 permissible explosives now on active list. Annual report.
- †RI 3325. A Study of Oxidation of the Oil in Two Air and Air-Gas Repressuring Projects, by T. W. Johnson and S. S. Taylor. 1937. 24 pp., 1 fig. Gives results of laboratory experiments to determine effect of air on crude oils and of a study of oxidation of oil in two commercial repressuring projects in which air and air-gas mixtures were used as repressuring mediums, in Martha field, Ky., and Delaware-Childers field, Okla.
- RI 3326. Permissible Electrically-Operated Room Hoists, by L. C. Ilsley, E. J. Gleim, and H. B. Brunot. 1937. 12 pp., 4 figs. Describes seven room hoists and one car-spotting hoist, now being constructed by four manufacturers.
- RI 3327. Behavior of Flame Safety Lamps in Mine Atmospheres Deficient in Oxygen, by A. B. Hooker, E. J. Coggeshall, and G. W. Jones. 1937. 6 pp., 2 figs. Reports results of investigation on behavior of permissible flame safety lamps in mine atmospheres deficient in oxygen and effects of methane on miner's ability to detect oxygen deficiency.
- †RI 3328. Progress Reports—Metallurgical Division. 16. Ore-Testing Studies. Ore-Dressing Tests and Their Significance, by W. F. Dietrich, A. L. Engel, and Morris Guggenheim. The Analysis of Molybdenum, by A. C. Rice and L. A. Yerkes. Report of Tests, by C. W. Davis and staff of ore-testing section. 1937. 161 pp., 27 figs. Gives first report of ore-testing section established July 1, 1935, which works on following objectives: (1) Standardization of important testing method of interest to mining industry; (2) analyses and routine tests incident to other Bureau investigations and those of other Government agencies; and (3) chemical and microscopic analyses of representative samples from mining districts and determination of recommended metallurgical practice. (Other progress reports of ore-testing series are RI 3370, 3425, 3484, 3515, 3564, 3569, 3628, and 3629.)
- †RI 3329. Mineral Economics Series. 1. Consumption of Ferrous Scrap and Pig Iron in the United States in 1935, by Richard J. Lund and H. W. Davis. 1936. 16 pp., 2 figs. Begins new series of publications to be prepared by Bureau's Economics Branch. Reviews consumption of ferrous scrap and pig iron in 1935 at open-hearth furnaces, bessemer converters, electric-steel furnaces, cupolas, air furnaces, and blast furnaces. (See also RI 3366 and 3420.)
- †RI 3330. Engineering Report on Oklahoma City Oil Field, Okla., by H. B. Hill, E. L. Rawlins, and C. R. Bopp. 1937. 243 pp., 69 figs. Describes productive structures in field, reviews production methods and practices, analyzes performance data on groups of wells in three strips across field, and discusses field and economic problems. Includes comprehensive bibliography.
- RI 3331. Progress Reports—Metallurgical Division. 14. Annual Report of the Metallurgical Division, Fiscal Year 1936, by R. S. Dean and others. 1937. 49 pp., 21 figs. Reviews projects undertaken during year by the copper metallurgy, electrometallurgical, iron and steel, lead and zinc, metallurgical fundamentals, ore-dressing, ore-testing, precious-metals, and special studies sections.
- †RI 3332. Survey of Fuel Consumption at Refineries in 1935, by G. R. Hopkins. 1937. 6 pp., 2 figs. Annual review of fuel consumption.
- †RI 3333. Progress Reports—Metallurgical Division. 15. Ore-Dressing Studies. Use of Wetting Agents in Flotation, by R. S. Dean, J. Bruce Clemmer, and S. R. B. Cooke. Flotation of Complex Molybdenum-Vanadium Ores from Mammoth, Ariz., by J. Bruce Clemmer and S. R. B. Cooke. Short-Column Hydraulic Elutriator for Subsieve Sizes, by S. R. B. Cooke. 1937. 50 pp., 19 figs. Reviews ore-dressing studies that have been under way during the past year. (See also RI 3259, 3437, and 3469R.)
- RI 3334. Application of Sand Filters to Oil-Field Brine-Disposal Systems, by Sam S. Taylor and L. F. Christianson. 1937. 28 pp., 2 figs. Represents results of work done under a cooperative agreement with the Kansas State Board of Health; this report submits data, observations, and conclusions from experiments using a pressure sand-filter system and brine from a siliceous limestone formation. (See also RI 3434.)

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- †RI 3335. Cooperative Fuel Research Motor-Gasoline Survey, Summer, 1936, compiled by E. C. Lane. 1937. 61 pp. Second of series of reports on properties of commercial motor fuels made pursuant to an agreement between the Cooperative Fuel Research Committee and the Bureau of Mines.
- †RI 3336. Beneficiation of Spodumene by Decrepitation, by Foster Fraas and Oliver C. Ralston. 1937. 13 pp. Describes inexpensive process that may be used to treat spodumene to extract lithium compounds.
- †RI 3337. Annual Report of the Explosives Division for the Fiscal Year 1936, by Wilbert J. Huff. 1937. 34 pp., 9 figs. Reviews organization of the Explosives Division and describes work during past year, including chemicals and physical tests of explosives and blasting devices, investigations of flammability of gases and vapors, and study of kinetics and mechanism of gaseous explosions.
- †RI 3338. Estimate of Natural-Gas Reserves from the Layton, Oolitic, and Oswego-Prue Horizons in the Oklahoma City Fields, by R. E. Helthecker. 1937. 35 pp., 11 figs. Gives an estimate of gas reserves in the Layton, Oolitic, and Oswego-Prue horizons of Pennsylvanian age measured by pressure-volume method. No attempt was made to outline productive acreage of these formations.
- †RI 3339. Progress Reports—Metallurgical Division. 17. Fixation of Sulfur from Smelter Smoke. Present Status of Sulfur Fixation and Plan of Investigations, by R. S. Dean. Vapor Pressure and Thermodynamic Properties of Ammonium Sulfites, by Hilary W. St. Clair. Recovery of Sulfur in Solid Compounds by the Addition of Ammonia and Water Vapor to Smelter Gas, by G. W. Marks and P. M. Ambrose. Diethylene Triamine and Other Amines as Agents for the Recovery of Sulfur Dioxide, by G. W. Marks and P. M. Ambrose. Oxidation of Ammonium Sulfite Solution, by Frank S. Wartman. 1937. 51 pp., 19 figs.
- RI 3340. Progress Reports—Metallurgical Division. 18. Studies of the Metallurgy of Copper. Distribution of Manganese Between Matte and Slag in the Smelting of Copper, by F. S. Wartman, G. M. Potter, and M. D. Schmid. Graphic Representation of the Ratio of Manganese Distribution Between Matte and Slag, by M. D. Schmid. Experiments in the Flash Roasting of Copper Concentrates, by F. S. Wartman and others. 1937. 19 pp., 5 figs. Summarizes briefly results of work on copper metallurgy carried out by Bureau staff since appearance of previous report (RI 3228) in May 1934.
- RI 3341. Progress Reports—Metallurgical Division. 19. Thermodynamic Studies. Calculation of the Specific Heats and Entropies of Metal Vapors from Spectroscopic Data, with Special Reference to Gaseous Iron and Copper, by K. K. Kelley. 1937. 18 pp., 1 fig. Method of calculating specific heat and entropy from spectroscopic data which has been successfully developed by Prof. W. F. Giaque is applied in this paper to iron and copper vapors.
- RI 3342. Low-Temperature Distillation Tests of Subbituminous Coal from the Denver Region Coal Field, Colorado, by W. H. Ode and W. A. Selvig. 1937. 7 pp. Gives results of low-temperature distillation tests of a subbituminous coal from Boulder County, Colo. (Highway mine), and another from Weld County, Colo. (Puritlan mine), at 200°, 350°, and 500° C.
- †RI 3343. Ventilation of Manholes. 2. Effect of the Size of the Manhole on Natural Ventilation, by G. W. Jones, W. E. Miller, John Campbell, and W. P. Yant. 1937. 8 pp., 3 figs. Natural-ventilation tests made in three manholes of varying sizes and design warrant the general conclusion that as area of openings in manhole cover is increased, ventilation is also increased; and that manhole of any given size will be ventilated by increasing number of ventilation openings in cover. (See also RI 3307, 3412, and 3496.)
- †RI 3344. Chloride Volatilization of Lithium from Spodumene, by Foster Fraas and Oliver C. Ralston. 1937. 11 pp., 4 figs. Need for cheaper lithium salts for air conditioning and dehumidification and for lithium feldspar to be used in glass and ceramic trades prompted work described in this report on making available lower-grade spodumene deposits by improved beneficiation and extraction.
- RI 3345. Permissible Electrically Operated Rock-Dust Distributors, by L. C. Hsley, E. J. Gleim, and H. B. Brunot. 1937. 16 pp., 4 figs. Describes in detail permissible rock-dust distributors developed by Mine Safety Appliance Co., Diamond Machine Co., and American Mine Door Co.
- RI 3346. Analyses of Crude Oils from Some Fields in Michigan, by E. L. Garton. 1937. 28 pp., 1 fig. Discusses briefly oil fields of Michigan and characteristics of crude oils produced from them. Gives analyses of 15 samples of crude.
- RI 3347. Importance of Adequate Voltage for Distribution Systems in Coal Mines, by E. J. Gleim. 1937. 12 pp., 3 figs. Discusses effects of low voltage in coal mines.
- †RI 3348. Cooperative Fuel-Research Motor-Gasoline Survey, Winter 1936-37, compiled by E. C. Lane. 1937. 56 pp. Third in series of reports on properties of commercial motor fuels, made in accordance with a cooperative agreement between the Cooperative Fuel Research Committee and the Bureau of Mines.
- †RI 3349. Recovery of Potash from Tailings of a Porphyry Copper Property, by G. L. Oldright, Virgil Miller, Horst Sieg, W. E. Keck, and F. K. Shelton. 1937. 17 pp. Describes process, involving use of salt and coal, that may utilize immense quantities of tailings from porphyry copper properties as source of potash. Process has been proved technically feasible on laboratory scale only; large-scale tests are necessary before technical application can be judged.
- †RI 3350. Production of Explosives in the United States During the Calendar Year 1936, by W. W. Adams and V. E. Wrenn. 1937. 15 pp., 2 figs. Gives annual data on production of explosives, representing an increase of 27 percent over amount in 1935.
- †RI 3351. National Safety Competition of 1936, by W. W. Adams, T. D. Lawrence, and E. E. Getzin. 1937. 22 pp. Names winners of twelfth annual safety competition, in which 328 mines and quarries were contestants; prizes were given to plant making best record in each of five groups.
- †RI 3352. A Method of Determining Porosity: A List of Porosities of Oil Sands, by D. B. Talianferro, Jr., T. W. Johnson, and E. J. Dewees. 1937. 24 pp., 2 figs. Gives information regarding pores or voids in reservoir rocks, vitally important in scientific extraction of petroleum from natural underground reservoirs. System was revised and developed at Bartlesville Station.
- †RI 3353. Earth Vibrations Caused by Quarry Blasting. Progress Report 1, by J. R. Thoenen and Stephen L. Windes. 1937. 73 pp., 7 figs. Outlines results of seismic measurements recorded in vicinity of quarry blasting under practical operating conditions. (See also RI 3319, 3407, 3431, and 3542.)
- †RI 3354. Hardening of Mud Sheaths in Contact with Oil and a Suggested Method for Minimizing Their Sealing Effect in Oil Wells, by C. P. Bowie. 1937. 25 pp., 5 figs. Gives results of tests to show that drilling mud hardens and becomes impervious to passage of oil, as does cap rock. Explains method of minimizing this hardening by circulating rubber with drilling fluid.
- †RI 3355. Studies of Roof Movement in Coal Mines. 1. Montour 10 Mine of the Pittsburgh Coal Co., by H. P. Greenwald, E. R. Maize, Irving Hartmann, and G. S. Rice. 1937. 41 pp., 21 figs. Presents first results

†Out of print.

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of systematic measurement of movement of roof strata in coal mines, begun in fall of 1935. Describes work on rapidly retreating rib line in a mechanized mine. (See also RI 3452, 3506, and 3562.)

†RI 3356. Sulfuric-Acid Extraction Methods for Determining Olefins and Aromatics in Hydrocarbon Oils. Optimum Conditions and Concentrations of Acid, by C. H. Fisher and Abner Eisner. 1937. 15 pp. Presents results of a general study of sulfuric-acid methods for determining olefins and aromatics in hydrocarbon oils.

RI 3357. Progress Reports—Metallurgical Division. 20. Annual Report of the Metallurgical Division, Fiscal Year 1936-37, by R. S. Dean and others. 1937. 55 pp., 23 figs. Third annual report of Metallurgical Division; reviews work of the 10 sections comprising it: Metallurgical fundamentals, special studies, electrometallurgical, ore-dressing, ore-testing, nonferrous metallurgy, precious-metals, copper metallurgy, blast-furnace studies, and metallurgy of steel.

†RI 3358. Analyses of Crude Oils from Some of the More Recently Discovered Rocky Mountain Fields, by Walter Murphy and H. M. Thorne. 1937. 24 pp. Search for new fields and new producing horizons in old fields of Rocky Mountain region has been quite intensive, and a number of new discoveries have been made. This paper not only gives analyses of crude oils from new producing horizons in old fields but also from more recently discovered fields.

RI 3359. Permissible Methane Detectors, by L. C. Hsley and A. B. Hooker. 1937. 4 pp., 3 figs. (Supplement to B 331.) Describes three methane detectors of combination Wheatstone-bridge and catalytic type approved since 1930.

†RI 3360. Bureau of Mines Midget Impinger for Dust Sampling, by J. B. Littlefield, Florence L. Feicht, and H. H. Schrenk. 1937. 4 pp., 3 figs. (Superseded by IC 7076.) Describes small, portable, hand-operated impinger; results obtained on silica dust agreed well with those obtained with regular impinger.

†RI 3361. Active List of Permissible Explosives and Blasting Devices Approved Prior to June 30, 1937. 1937. 22 pp. Lists 196 brand names.

RI 3362. Properties of California Crude Oils. V. Additional Analyses, by E. C. Lane and E. L. Garton. 1937. 21 pp. One of series of reports on oil-producing districts of the United States. Includes short discussion of results, tabular data, and individual analyses of 16 California crude oils. (See also RI 2595, 2608, 2846, and 3074.)

†RI 3363. Permissible Electrically Operated Hand-Held Coal Drills, by L. C. Hsley, E. J. Gleim, and H. B. Brunot. 1937. 13 pp., 5 figs. Deals with safety features of the type of small coal drill designed to be held in hands or supported against body. Includes all drills of this type approved prior to July 1, 1937.

RI 3364. Progress Reports—Metallurgical Division. 21. Studies in Nonferrous Metallurgy Collection of Gold by Iron Abraded in Grinding, by S. R. Zimmerley. Flotation of Oxidized Silver-Lead Ores as Influenced by Modified Grinding, by S. R. Zimmerley. 1937. 30 pp. One of series of reports prepared by Metallurgical Division so that information on results of its investigations may be disseminated quickly.

RI 3365. Explosion in School Building at New London, Tex., March 18, 1937, by D. J. Parker, G. W. Jones, H. B. Hill, and Gustav Wade. 1937. 29 pp., 14 figs. Describes results of investigation of three Bureau of Mine divisions—Safety, Explosives, and Petroleum and Natural Gas—at scene of disaster. Concludes that cause of tragedy was ignition and ensuing explosion of large body of natural gas and

air that had accumulated in unventilated space under first floor at front of building.

†RI 3366. Mineral Economics Series. 2. Consumption of Ferrous Scrap and Pig Iron in the United States in 1936, by Robert H. Ridgway, H. W. Davis, and M. E. Trought. 1937. 21 pp., 1 fig. Second in series of reports prepared by Economics Branch, Bureau of Mines. Reviews consumption of ferrous scrap and pig iron at open-hearth furnaces, bessemer converters, electric steel furnaces, cupolas, air furnaces, and blast furnaces. (See also RI 3329 and 3420.)

†RI 3367. Survey of Fuel Consumption at Refineries in 1936, by G. R. Hopkins. 1938. 6 pp., 2 figs. Annual review of fuel consumption. Petroleum-refining industry established new record in fuel efficiency in 1936, using only 597,000 B. t. u. of heat to refine 1 barrel of crude, compared to an average of 615,000 in 1935.

†RI 3368. Petrographic Identification at Atmospheric Dust Particles, by Wilder D. Foster and H. H. Schrenk. 1938. 10 pp., 3 figs. Reviews briefly use and limitations of petrographic microscope and method used by Health Division, Bureau of Mines, to determine composition of air-borne dust, a procedure frequently desirable in estimating hazardous qualities of a dusty atmosphere.

RI 3369. Relation of Dust Concentration to Depth of Hole During Wet Drilling, by J. B. Littlefield and H. H. Schrenk. 1938. 5 pp., 2 figs. One of a number of studies to determine concentration of dust in air during complete cycle of operation in wet drilling. Tests conducted at Mount Weather testing adit, Bureau of Mines.

†RI 3370. Progress Reports—Metallurgical Division. 22. Ore-Testing Studies, 1936-37. Special Methods of Analysis and Testing and Details of Tests on Various Ores. Laboratory Testing for Cyanidation, by T. A. Jackson. Spectroscopic Analysis, by A. C. Rice and L. A. Yerkes. Analysis of Molybdenum, by A. C. Rice and C. E. Arrington. The Determination of Chromite Ores and Concentration Products, by F. W. Hoertel. Quantitative Electrodeposition of Cobalt, by Morris M. Fine. A Staining Method for the Differentiation Between Feldspar and Quartz, by A. L. Engel. Construction and Operation of an H. Type A. C. Laboratory Magnetic Separator, by A. L. Engel. Establishment of Ore-Testing Procedures: Report of Tests, by C. W. Davis and staff of ore-testing section. 1938. 174 pp., 15 figs. Second annual report of ore-testing section; discusses progress made in investigations relating to standardization of testing methods, in conducting routine tests for other Government agencies, and in establishing satisfactory methods of treating representative ores from various mining districts. (Other progress reports of ore-testing series are RI 3328, 3425, 3484, 3515, 3564, 3569, 3623, and 3629.)

†RI 3371. Performance of a Baum-Type Coal-Washing Jig, by H. F. Yancey and M. R. Geer. 1938. 18 pp., 4 figs. Evaluates principal factors—size and specific gravity—upon which separation of coal and impurity depends.

RI 3372. Performance of a Pulsator-Type Coal-Washing Jig, by H. F. Yancey, M. R. Geer, and R. E. Shinkoskey. 1938. 19 pp., 5 figs. Deals with separation of coal from its associated impurities by means of a pulsator-type jig. One of series of detailed studies to determine efficiency and mechanism of separating coal and impurities in various coal-cleaning devices.

†RI 3373. Microprojection Method for Counting Impinger Dust Samples, by Carlton E. Brown, Lester A. H. Baum, William P. Yant, and Helmuth H. Schrenk. 1938. 9 pp., 4 figs. Describes microprojection technique for counting impinger dust samples. Method gives essentially same results as regular microscopic method, causes relatively little eye-

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- strain, and is more rapid in that it permits more concentrated samples to be counted without secondary dilution.
- †RI 3374. Cooperative Fuel Research Motor-Gasoline Survey, Summer 1937, compiled by E. C. Lane. 1937. 57 pp. Fourth in series of reports on properties of commercial motor fuels; gives results of analyses in oil-company laboratories of regular-price, premium-price, and third-grade motor gasoline. Survey was made in accordance with cooperative agreement between Cooperative Fuel Research Committee and Bureau of Mines.
- †RI 3375. Investigations During 1936 of Combustibles in Manholes in Boston, Mass., by G. W. Jones, John Campbell, F. M. Goodwin, and W. J. Huff. 1938. 24 pp., 1 fig. Annual report of investigations conducted by Bureau of Mines in cooperation with Edison Electric Illuminating Co. of Boston and Boston Consolidated Gas Co. to obtain information as to hazards that might exist in manholes, conduits, and other underground openings in typical large city and to determine value of systematic manhole survey. (See also RI 3109, 3192, 3213, 3260, 3305, 3321, 3433, and 3604.)
- †RI 3376. Concentration of Southern Barite Ores, by R. G. O'Meara and G. D. Coe. 1938. 12 pp. With a view to increasing reserves of marketable barite by determining availability of concentration methods for treatment of low-grade ores, the Bureau of Mines conducted an investigation of amenability of southern barite ores to table concentration and froth flotation.
- RI 3377. Primary Crushing. Progress Report 1, by Mark Sheppard and C. N. Witherow. 1938. 11 pp., 18 figs. First of a series that will include discussions of various phases of primary crushing. This paper is confined to consideration of relationship between size gradation of crusher feed and size gradation of crusher product. (See also RI 3380, 3390, and 3432.)
- RI 3378. Composition and Inflammability of Gaseous Distillation Products from Heated Anthracite, by G. S. Scott and G. W. Jones. 1938. 6 pp., 2 figs. Study of temperature-composition relationships of gaseous distillation products of anthracite as a means of estimating conditions in an underground fire zone and of predicting possibility or probability of an explosion in sealed area.
- †RI 3379. Burning of Various Coals Continuously and Intermittently on a Domestic Overfeed Stoker, by H. F. Yancey, K. A. Johnson, A. A. Lewis, and J. B. Cordiner, Jr. 1938. 30 pp., 5 figs. Summarizes briefly principal results of 35 heating trials on various ranks and sizes of coal mined in Washington to determine relative suitability of coals for use on domestic-type overfeed stoker and particularly amount of useful heat recoverable with a good furnace and boiler under intermittent burning conditions required in residential heating plants.
- RI 3380. Primary Crushing. Progress Report 2, by Mark Sheppard. 1938. 16 pp., 12 figs. Second report of series recording results of crushing tests made at various quarries in the United States to determine relationship between size gradations of feed to and product from primary crushers, particle shape of crushed product, and differences in gradation and particle shape produced by various crushers and by crushing different kinds of stone. (See also RI 3377, 3390, and 3432.)
- †RI 3381. Effect of Angle of Drilling on Dust Dissemination, by Carlton E. Brown and H. H. Schrenk. 1938. 7 pp., 3 figs. Gives results of tests made at Butte (Mont.) mines of Anaconda Copper Co. to determine whether angle at which hole is drilled affects amount of dust disseminated into air during wet drilling.
- †RI 3382. Grindability of Alabama Coals, by Ellis S. Hertzog and James R. Cudworth. 1938. 8 pp., 2 figs. Discusses grindability of Alabama coals, one phase of special study of some chemical and physical properties of Alabama coals. (See also RI 3409.)
- †RI 3383. Annual Report of the Explosives Division, Fiscal Year 1937, by Wilbert J. Huff. 1938. 36 pp., 14 figs. Describes work done by Explosives Division during fiscal year, including investigations on flammability of gases and vapors, study of kinetics and mechanism of gaseous explosions, research on explosives and Diesel engines underground, and chemical and physical tests of explosives and blasting devices.
- †RI 3384. Friability of Alabama Coals, by Ellis S. Hertzog and James R. Cudworth. 1938. 8 pp., 2 figs. One phase of special study of physical and chemical properties of Alabama coals to determine friability, grindability, B. t. u. value, and ash-fusion temperature. This report covers friability only.
- RI 3385. Analyses of Crude Oils From Some Fields of Pennsylvania and New York, by E. C. Lane and E. L. Garton. 1938. 68 pp. Gives analyses of samples collected recently from fields in Pennsylvania and New York and, for comparison, samples taken earlier in history of these fields; includes 58 samples in all.
- RI 3386. Compression Tests of Roof-Salt Slabs Supported by Potash Salt Pillars, by H. P. Greenwald and H. C. Howarth. 1938. 16 pp., 10 figs. Reports results of investigation made at Carlsbad, N. Mex., to obtain data that could be used in determining size of pillars that should be left during advance mining of potash-bearing salt.
- †RI 3387. Dust Sampling with the Bureau of Mines Midget Impinger, Using a New Hand-Operated Pump, by J. B. Littlefield and H. H. Schrenk. 1938. 4 pp., 2 figs. (Superseded by IC 7076.) Describes new hand-operated pump to operate midget impinger dust-sampling apparatus recently developed by Bureau of Mines. Compares results obtained with midget impinger and with regular impinger.
- †RI 3388. Control of Dust from Blasting by a Spray of Water Mist, by Carlton E. Brown and H. H. Schrenk. 1938. 13 pp., 1 fig. Presents results of tests to determine effectiveness of spraying blasted material with water mist, commonly called compressed-air blast or water blast, to reduce concentration of dust in air after blasting and during mucking.
- †RI 3389. Fuel for Permissible Flame Safety Lamps, by A. B. Hooker and E. J. Coggeshall. 1938. 5 pp., 2 figs. (For revision, see IC 7301.)
- †RI 3390. Primary Crushing. Progress Report 3, by Mark Sheppard. 1938. 10 pp., 11 figs. Third report of series recording results of crushing tests at various quarries throughout the United States to determine relationship between size gradation of feed to and product from primary crushers, particle shape of crushed product, and differences in gradation and particle shape produced by various types of crushers and by crushing different types of stone. (See also RI 3377, 3380, and 3432.)
- RI 3391. Permissible Electrically Operated Post Drills and Drilling Machines, by L. C. Hilsley, E. J. Gleim, and H. B. Brunot. 1938. 17 pp., 7 figs. Classifies and describes coal drills approved by Bureau of Mines; deals specifically with post drills and drilling machines approved to July 1, 1937.
- †RI 3392. Résumé of Problems Relating to Edgewater Encroachment in Oil Sands, by F. G. Miller and H. C. Fowler. 1938. 18 pp. Reviews experimental work of number of investigators on problems of edgewater encroachment; concludes that with proper control edgewater may be made an ally of oil producer in helping him to improve oil-recovery efficiency.
- †RI 3393. Relation of Dust Dissemination to Water Flow through Rock Drills, by Carlton E. Brown and

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- H. H. Schrenk. 1938. 6 pp., 3 figs. Comparative tests of relationship between dust concentration resulting from drilling with two stoper and four drifter drills into medium-hard granitic rock and rate of water flow through drill showed that as water flow increased dust concentrations decreased.
- †RI 3394. Disposal of Petroleum Wastes on Oil-Producing Properties, by Ludwig Schmidt and C. J. Wilhelm, with a chapter on Soils and Water Resources of Kansas Oil Areas, by Ogden S. Jones. 1938. 25 pp., 17 figs. Presents results of work done under cooperative agreement between Kansas State Board of Health and Bureau of Mines in attempt to solve problem of disposal of petroleum wastes and oil-field brines. Study shows necessity for handling oil-field wastes, as distinguished from oil-field brines, so efficiently that crops and livestock are not injured.
- RI 3395. Extinction of Propylene Flames by Diluting with Nitrogen and Carbon Dioxide and Some Observations on the Explosive Properties of Propylene, by G. W. Jones and R. E. Kennedy. 1938. 14 pp., 4 figs. Reports results of experiments made to establish limits of flammability of propylene-air mixtures to which varying proportions of nitrogen and carbon dioxide were added. Resultant graphs and tables are required for calculating limits of flammability of complex gases containing propylene as well as other combustibles.
- RI 3396. Calibration of Positive-Displacement Oil Meters, by R. E. Heithecker and W. B. Berwald. 1938. 21 pp., 4 figs. Describes operation of oil meters that utilize principle of determining volumes of liquid by alternately drawing in and discharging given quantities of fluid from confined space or compartment of known volume and mechanically counting number of displacements.
- †RI 3397. Flotation and Agglomerate Concentration of Nonmetallic Minerals, by Oliver C. Ralston. 1938. 63 pp. Discusses flotation of phosphates, limestone, magnesite and dolomite, graphite, coal, carbons and chars, bituminous sands, fluorite, zircon, talc, barite, kyanite, chromite, cassiterite, feldspar, beryl, spodumene, nephelite, quartz, mica, sericite, clay, bauxite, tungsten minerals, ilmenite and rutile, manganese ore, oxidized iron ore, sulfur, cryolite, and alunite and alumina. Also discusses agglomeration of phosphate, limestone, soluble salines, kyanite, fluorite, and coal. Includes extensive bibliography.
- RI 3398. Effect of Oxidation on the Volatile Matter of Anthracite and Its Significance in Mine-Fire Investigations, by G. S. Scott, G. W. Jones, and H. M. Cooper. 1938. 8 pp., 9 figs. Presents some results of work on detection of incipient heating underground in mines and aboveground in refuse banks, which formed part of an investigation of anthracite-mine fires.
- RI 3399. Bureau of Mines Apparatus for Determining the Dew Point of Gases Under Pressure, by W. M. Deaton and E. M. Frost, Jr. 1938. 4 pp., 2 figs. Describes apparatus designed to determine dew point of gases, to be used in connection with study of gas hydrates and their relationship to pipe-line operation, a cooperative project of Bureau of Mines and Natural Gas Department of American Gas Association.
- †RI 3400. Progress Reports—Metallurgical Division. 24. Mineral Physics Studies. Physicochemical Nature of Metallic Interfaces, by R. S. Dean. Development and Application of the Coercimeter, by V. H. Gottschalk. Construction and Operation of a Magnetic Balance, by F. S. Wartman. Coercive Force of Rods Deformed by Torsion, by E. V. Potter. Sonic Flocculator as a Fume Settler: Theory and Practice, by H. W. St. Clair. Effect of Lattice Discontinuities on the Magnetic Properties of Magnetite, by Donald Jay Doan. 1938. 86 pp., 48 figs. Third mineral physics report in Metallurgical Division progress reports series. (See also RI 3223, 3268, and 3570.)
- †RI 3401. Efficiency of Impingers for Collecting Lead Dusts and Fumes, by J. B. Littlefield, Florence L. Feicht, and H. H. Schrenk. 1938. 9 pp. (Superseded by IC 7076.) Describes tests to determine efficiencies of large and midjet impingers for collecting lead dust; compares results.
- †RI 3402. Flow Characteristics, Composition, and Some Liquid-Phase Properties of Hydrocarbon Fluids from a "Combination" Well, by C. K. Ellerts and M. A. Schellhardt. 1938. 34 pp., 15 figs. Gives preliminary results of field and laboratory tests to determine phase relationships of fluid in a deep high-pressure and high-temperature reservoir from which gas and hydrocarbon liquid of light gravity were produced.
- †RI 3403. Determination of the Swelling Properties of Coal During the Coking Process, by H. S. Auvil and J. D. Davis. 1938. 18 pp., 10 figs. Describes vertical slot oven with movable wall and sole-heated oven, similar to that used by Bethlehem Steel Co., designed and built by Bureau of Mines to test coking coals for expansion. Describes test procedure and gives data on effect on expansion or contraction of rate of heating through plastic range, charge density, and load under which charge is coked.
- †RI 3404. The Pegmatites at Tinton, S. Dak., by Frank L. Hess and Barnabas Bryan, Jr. 1938. 19 pp., 2 figs. Gives results of reconnaissance examination of 21 pegmatites in neighborhood of Tinton, S. Dak., and discusses in detail incomplete work done on Volney and Giant claims on Tantalum Hill between September 14 and October 3, 1936.
- RI 3405. Oxidation of Anthracite: Effect of Time of Contact on the Concentration of Oxygen in the Effluent Gases, by G. S. Scott and G. W. Jones. 1938. 7 pp., 4 figs. Describes apparatus used and tests made on anthracite to determine effect of contact time (inverse rate at which air passes through anthracite) on percentage of oxygen in effluent gases when air is passed through anthracite heated to high temperature but below its ignition temperature.
- RI 3406. Progress Reports—Metallurgical Division. 23. Electrometallurgical Investigations. Electrolytic Manganese, by S. M. Shelton, M. B. Royer, and A. P. Towne. Boulder City (Nev.) Electrometallurgical Laboratory, by J. Koester and R. G. Knickerbocker. Pullman (Wash.) Unit, Electrometallurgical Section, by H. A. Doerner. 1938. 28 pp., 24 figs. Records successful solution of electrolytic manganese problem and describes plant and work of Boulder City electrometallurgical laboratory and Pullman unit of electrometallurgical section. (Other progress reports of electrometallurgical series are RI 3322, 3438, 3483, 3491, and 3500.)
- †RI 3407. Earth Vibrations Caused by Mine Blasting. Progress Report 2, by J. R. Thoenen and Stephen L. Windes. 1938. 46 pp., 45 figs. Gives results of seismic tests in an underground limestone mine in which conditions could be controlled with precision to ascertain possible effects of certain variables in quarry blasting. (See also RI 3319, 3353, 3431, and 3542.)
- †RI 3408. Cooperative Fuel Research Motor-Gasoline Survey, Winter 1937-38, compiled by E. C. Lane. 1938. 29 pp. Fifth in series of reports on properties of commercial motor fuels; gives results of analyses in oil-company laboratories of regular-price, premium-price, and third-grade motor gasoline. Survey was made in accordance with cooperative agreement between Cooperative Fuel Research Committee and Bureau of Mines.
- †RI 3409. Ball-Mill Grindability Indexes of Some American Coals, by H. F. Yancey and M. R. Geer. 1938. 9 pp., 2 figs. Second in series of reports issued

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- by Bureau of Mines to provide information on grindability of American coals; presents results of grindability tests of 34 samples of coals from Illinois, Kentucky, Pennsylvania, Utah, Virginia, Washington, West Virginia, and British Columbia, made at Northwest Experiment Station, Bureau of Mines, in cooperation with College of Mines, University of Washington. (See also RI 3382.)
- RI 3410. Porosity of the Sundance Sand in the Lance Creek Oil Field, Wyoming, by H. Dale Nichols. 1938. 15 pp., 4 figs. Presents in tabular and graphic form results of a series of porosity determinations on core samples collected from reservoir sands of Lance Creek oil field, Niobrara County, Wyo.
- RI 3411. Tests of a Barrier Using Rock Dust in Paper Bags, by H. P. Greenwald and H. C. Howarth. 1938. 16 pp., 10 figs. Describes tests made in Bureau of Mines Experimental coal mine to determine efficiency of new type of rock-dust barrier devised by safety director of large coal corporation for use primarily in trackless entries; it consisted of paper sacks of rock dust supported close to roof on boards 6 inches wide, so arranged with trigger wire and vane arrangement as to be operated by force of an explosion.
- †RI 3412. Ventilation of Manholes. 3. Effect of Wind Velocity on Natural Ventilation, by G. W. Jones, E. S. Baker, and John Campbell. 1938. 5 pp., 1 fig. Results show that wind velocity or speed at which air passes over manhole cover has marked effect on ventilation; for example, increasing wind velocity to 10 miles per hour increased ventilation in manholes an average of more than 50 percent. (See also RI 3307, 3343, and 3496.)
- †RI 3413. National Safety Competition of 1937, by W. W. Adams, T. D. Lawrence, and E. E. Getzin. 1938. 22 pp. Gives results of thirteenth annual accident-prevention competition conducted by Bureau of Mines during calendar year 1937; 318 mines and quarries participated in contest.
- †RI 3414. Production of Explosives in the United States During the Calendar Year 1937, by W. W. Adams and V. E. Wrenn. 1938. 17 pp., 2 figs. Gives annual data on production of explosives; 404,744,294 pounds was produced in 1937, an increase of 3 percent over 1936.
- †RI 3415. Progress Reports—Metallurgical Division. 26. Fixation of Sulfur from Smelter Smoke, by A. H. Roberson and G. W. Marks. 1938. 45 pp., 9 figs. Reports results of experiments with some aliphatic amines to determine most suitable absorbents of carbon dioxide emitted from smokestacks of concentrating plants that sinter, roast, and smelt metallic sulfides in an effort to reduce its damaging effect. Deals largely with physical properties of three amines that appeared to be most promising; compares capacities of absorbing solutions. Also includes review of recent papers and patents on sulfur recovery compiled by M. W. von Bernewitz.
- RI 3416. Truck vs. Rail Haulage in Bituminous-Coal Strip Mines, by Albert L. Toenges and Frank A. Jones. 1938. 54 pp., 14 figs. A study of 32 separate operations with wide range of physical conditions to determine where automotive equipment can be used, where rail haulage should be used, or whether certain conditions favor a combination of both systems. Influencing elements for each type of haulage are considered individually, and their effect on cost and investment is shown in average curves drawn from data furnished by mines visited.
- †RI 3417. Survey of Crude Oil in Storage, 1936-37, by Petroleum Economics Division and Petroleum and Natural Gas Division, Bureau of Mines. 1938. 51 pp., 5 figs. Gives results of survey of crude-oil stocks made by Bureau of Mines at request of Interstate Oil Compact Commission and other groups interested in forecasts of demand. Survey involved collection of statistical data covering quantities, locations, and types of tanks; collection of samples; analysis of samples at Bartlesville; and evaluation of facts. Fifteen hundred samples were collected and about 90,000 determinations made. (See also RI 3442.)
- †RI 3418. Consumption of Primary and Secondary Tin in the United States in 1936 and 1937, by John B. Umhau and M. E. Trought. 1938. 8 pp. Gives statistical data regarding tin used in the United States by industries; covers stocks, purchases, plant losses, and plant scrap.
- †RI 3419. Progress Reports—Metallurgical Division. 25. Annual Report of the Metallurgical Division, Fiscal Year 1937-38, by E. S. Dean and others. 1938. 80 pp., 10 figs. Includes reports on work of sections of Metallurgical Division: Metallurgical fundamentals, special studies, electrometallurgical, ore-dressing, nonferrous metallurgy, precious-metals, copper metallurgy, blast-furnace studies, and metallurgy of steel.
- †RI 3420. Mineral Economics Series. 3. Consumption of Ferrous Scrap and Pig Iron in the United States in 1937, by Robert H. Ridgway, H. W. Davis, and M. E. Trought. 1938. 22 pp. Third in series of reports covering study inaugurated in 1935 by Bureau of Mines in response to requests from trade organizations and others for detailed statistics on this phase of iron and steel industry. (See also RI 3329 and 3366.)
- †RI 3421. Active List of Permissible Explosives and Blasting Devices Approved Prior to June 30, 1938. 1938. 21 pp. Contains list of permissible explosives and blasting devices as of June 30, 1938, and outlines permissible conditions governing their use.
- RI 3422. Desalting Crude Petroleum. A Review of the Literature, by L. F. Christianson and Joseph W. Horne. 1938. 23 pp., 1 fig. A compilation of information found in the literature on problem of desalting crude petroleum. Points out deleterious effect of salt upon refinery equipment, discusses reasons for corrosion and clogging of equipment, and describes processes and methods for or related to desalting of petroleum.
- RI 3423. Chemical and Refining Study of Some Wyoming Black Oils, by H. M. Thorne and Walter Murphy. 1938. 39 pp., 1 fig. A progress report giving results of themodecomposition studies on black oils undertaken by Bureau of Mines in cooperation with University of Wyoming. Includes data on yields and characteristics of products obtained by cracking Oregon Basin, Dallas-Derby, and Garland topped crude oils to dry coke at several pressures and temperatures, as well as results of chemical treatment of some naphthas and determination of their octane numbers before and after treatment.
- RI 3424. The Agglomerating Index of Coal, by J. F. Barkley and L. R. Burdick. 1938. 8 pp. Defines agglomerating index and explains its use in classifying coals.
- †RI 3425. Progress Reports—Metallurgical Division. 27. Ore-Testing Studies, 1937-38. The Microscope in Ore Testing, by R. E. Head. Treatment of Arsenical Gold Ores, by J. A. Woolf and T. A. Jackson. Copper and Antimony in Cyanidation, compiled by M. W. von Bernewitz. Treatment of Mill Water for Flotation, by A. L. Engel and Morris Guggenheim. Determination of Antimony in Ores and Concentration Products, by F. W. Hoertel. Spectrographic Analysis, by A. C. Rice. Ore-Testing Studies: Precious-Metals Section, by E. S. Leaver and staff. Ore-Testing Studies: Ore-Dressing Section, by A. L. Engel and Morris Guggenheim. 1938. 119 pp., 4 figs. Third of series of annual reports on ore-testing work done by Metallurgical Division, Bureau of Mines. (Other progress reports of ore-testing series are RI 3328, 3370, 3484, 3515, 3564, 3569, 3628, and 3629.)

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- RI 3426. Some Tests of Acid-Resistant Pipe, by R. D. Leitch. 1938. 7 pp., 8 figs. Describes tests of various specimens of pipe to determine effect of low-acid, high-acid, and intermediate-acid mine waters on life of pipe; summarizes results.
- †RI 3427. Annual Report of the Nonmetals Division, Fiscal Year 1938, by Oliver C. Ralston and others. 1938. 38 pp., 4 figs. Covers work of Nonmetals Division, including coal and potash investigations; calcination and hydration of lime; tests to indicate feasibility of producing lightweight aggregates from slate-quarry and mill wastes; utilization of opaline silica for production of silica brick; studies of plasticity of mineral dispersions, properties and uses of olivine, cracking of steel by boiler water, and flotation and agglomeration processes; quantitative spectroscopy; beneficiation of an Alabama kaolin; float-and-sink fractionation of low-phosphorus ferrous sandstone; and electrostatic concentration of minerals.
- RI 3428. Carbonizing Properties of a Subbituminous Coal from Puritan Mine, Dacono, Weld County, Colo., by J. D. Davis and V. F. Parry. 1939. 32 pp., 9 figs. Gives yields and quality of products obtained from low-rank, noncoking coal carbonized in BM-AGA apparatus at 500°, 600°, 700°, 800°, and 900° C. Compares carbonizing results with similar tests on Pittsburgh coking coal. Also includes tests to determine properties of chars from this coal.
- †RI 3429. Cooperative Fuel Research Motor-Gasoline Survey, Summer 1938, compiled by E. C. Lane. 1938. 31 pp. Sixth in series of reports on properties of commercial motor fuels; gives results of analyses in oil-company laboratories of regular price, premium-price, and third-grade gasoline. Survey was made in accordance with cooperative agreement between Cooperative Fuel Research Committee and Bureau of Mines.
- †RI 3430. Survey of Fuel Consumption at Refineries in 1937, by G. R. Hopkins. 1938. 7 pp., 2 figs. Annual review of fuel consumption.
- †RI 3431. House Movement Caused by Ground Vibrations, by J. R. Thoenen and S. L. Windes. 1938. 14 pp., 2 figs. Report on study of characteristics of ground vibrations produced by quarry blasts. (See also RI 3319, 3353, 3407, and 3542.)
- †RI 3432. Primary Crushing. Summary of Field Tests, by Mark Sheppard. 1939. 41 pp., 5 figs. Describes investigation of relationship between size gradation of feed to and product from primary crushers and effect of crushing on shape of products from primary crushing under various conditions, as disclosed by 33 tests conducted at 11 commercial plants. (See also RI 3377, 3390, and 3390.)
- RI 3433. Investigations During 1937 of Combustibles in Manholes in Boston, Mass., by G. W. Jones, John Campbell, F. M. Goodwin, and W. J. Huff. 1939. 19 pp., 1 fig. Gives results of cooperative investigation conducted by Bureau of Mines and public utilities of Boston, Mass., for purpose of identifying and eliminating combustible hazards in manholes in that city and surrounding territory. (See also RI 3109, 3192, 3213, 3280, 3305, 3321, 3375, and 3604.)
- †RI 3434. Typical Oil-Field Brine-Conditioning Systems: Preparing Brine for Subsurface Injection, by Sam S. Taylor, C. J. Wilhelm, and W. C. Holliman. 1939. 71 pp., 15 figs. Eighth in series of reports completed under cooperative agreement between Kansas State Board of Health and Bureau of Mines and second report dealing specifically with subsurface disposal of oil-field brines. Describes in detail construction and operation of some typical brine conditioning and disposal systems; includes chemical and corrosive characteristics of brines before, during, and after conditioning in various types of systems for subsurface injection; and gives complete description and history of brine-injection wells. Also includes cost data furnished by several operators. (See also RI 3334.)
- RI 3435. Some Asphalts from Oregon Basin (Wyoming) Crude Oil, by K. E. Stanfield. 1939. 17 pp., 9 figs. Progress report of study of asphalts from Wyoming black oils undertaken by Bureau of Mines in cooperation with University of Wyoming. Describes glass distilling apparatus and method of procedure for reducing asphaltic crude oil to asphalt. Estimates properties of asphalts and calculates their temperature susceptibilities.
- †RI 3436. Progress Reports—Metallurgical Division. 29. Silver-Recovery Studies. Some Factors Affecting the Flotation of Silver Minerals, by E. S. Leaver and J. A. Woolf. 1939. 25 pp. Points out some factors that affect flotation of silver minerals. Work was done in an effort to improve flotation recovery not only of silver minerals that are more or less refractory to cyanidation but also of silver minerals known to dissolve readily in cyanide. (See also RI 3275 and 3661.)
- †RI 3437. Progress Reports—Metallurgical Division. 31. Ore-Dressing Studies. Flotation of Southern Illinois Lead-Zinc-Fluorspar Ores, by J. B. Clemmer, W. E. Duncan, F. D. DeVaney, and M. Guggenheim. 1939. 31 pp., 4 figs. Records observations and data obtained in applying selective flotation to several ores from Cave in Rock area for production of lead, zinc, and fluorspar concentrates. (See also RI 3239, 3333, and 3469R.)
- †RI 3438. Progress Reports—Metallurgical Division. 30. Electrometallurgical Investigations. Recovery of Potassium Sulfate and Alumina from Alunite by Fusion with Boric Acid, by J. Koster, R. G. Knickerbocker, A. L. Fox, and P. E. Perry. 1939. 15 pp., 3 figs. Describes in detail a process for recovering potash and alumina from alunite ores. (Other progress reports of electrometallurgical series are RI 3322, 3406, 3483, 3491, and 3500.)
- RI 3439. Mount Weather Testing Adit. Progress Report 1, by McHenry Mosier and Wing G. Agnew. 1939. 12 pp. Describes operations at testing adit since work was begun in September 1936. Research covers tests of alloy-steel bits, alloy-steel rods, anvil block v. standard drifter, reaming v. standard cross bits, bit gage v. drilling speed, relationship of dust concentration to depth of hole during wet drilling, use of wetting agents for reducing dust in wet drilling, diameter of drill hole v. bit gage, and stemming.
- RI 3440. Reclamation of Stripped Coal Land, by Albert L. Toenges. 1939. 11 pp., 26 figs. Discusses work done in certain States to reclaim surface of land from which coal has been removed by stripping.
- RI 3441. Progress Reports—Metallurgical Division. 28. Analytical Studies. Volumetric Determination of Molybdenum, by C. E. Arrington and A. C. Rice. 1939. 53 pp. First of series of analytical studies. Consists of three parts: I. Reduction and Use of Oxidants. II. Alpha-Benzoinoxime Volumetric Method and Comparison with Gravimetric Method. III. Separation of Molybdenum from Tungsten.
- RI 3442. Analyses of Crude Oils from Some Fields of Oklahoma, by O. C. Blade. 1939. 29 pp. Discusses briefly properties of crude-oil samples collected in some major producing fields of State; study was conducted by Bureau of Mines in cooperation with State of Oklahoma and is a continuation of survey of crude oil in storage suggested by Interstate Oil Compact Commission (RI 3417). Gives analyses of 44 samples of oil from various fields of State. (See also RI 3592 and 3802.)
- †RI 3443. Explosion and Fire Hazards of Combustible Anesthetics, by G. W. Jones. 1939. 17 pp., 2 figs. Gives information on hazards of anesthetics for use of hospitals. Most of data were obtained in connec-

†Out of print.