

- a 40-ton-a-day plant, pilot-mill concentrator successfully duplicated ore-dressing methods first developed in Bureau laboratories. In separate continuous plant runs, manganese products assaying plus 50 percent manganese when sintered were made. Contains details of these continuous runs and metallurgical data with descriptions of separate units of pilot-mill concentrator, such as coarse-grinding plant, fine grinding, sizing and classification, flotation section, gravity concentration, thickeners and filters, drying unit, dust-collecting system, water reclamation, and sampling and reagent equipment.
- RI 4124. Blue Ledge Copper-Zinc Mine, Siskiyou County, Calif., by R. J. Hundhansen, 1947. 16 pp., 3 figs. In 1943 and 1944 Bureau of Mines sampled and explored Blue Ledge copper-zinc mine. Channel samples were cut at approximately 50-foot intervals throughout mine. One hundred and seventy-two channels were cut, comprising 585 samples, which were assayed for copper, zinc, gold, and silver. Total length of sample channels was 1,487 feet. Four diamond-drill holes with a combined length of 910 feet were drilled. Records of diamond-drill hole assays for each hole are included.
- RI 4125. Inflammability of Dimethyl Ether-dichlorodifluoromethane-Air Mixtures, by G. W. Jones and F. E. Scott. 1947. 4 pp., 2 figs. Gives results of tests made to establish limits of inflammability of dimethyl ether in air. Limits of inflammability of dimethyl ether by volume in air at laboratory temperatures and pressures were 3.45 percent for the lower and 26.7 for the upper limit. When dichlorodifluoromethane (freon-12) is added to dimethyl ether-air mixtures, the limits of inflammability are narrowed progressively. When mixtures contain 17.58 percent or more of freon-12, all mixtures are rendered noninflammable irrespective of amounts of dimethyl ether or air present.
- RI 4126. Recovery of Soda and Removal of Sulfate in the Lime-Soda Process for Alumina Production, by Francis J. Frattali, Stanley J. Green, and Verda I. McLendon. 1947. 14 pp., 12 figs. Discusses method of recovery of soda and removal of sulfate in lime-soda process for alumina production. Bibliography included.
- RI 4127. Investigation of Magnetite Deposits at Star Lake, St. Lawrence County, N. Y. (to November 1945), by W. T. Millar. 1947. 14 pp., 14 figs. Between 1943 and 1945 Bureau of Mines investigated magnetite deposits at Star Lake, N. Y., by geophysical surveying and diamond drilling. Tables showing results of investigation are included. (See also RI 4131.)
- RI 4128. Gasification of Lignite and Subbituminous Coal. Progress Report for 1945-46. I. Operation of a Commercial-Scale Pilot Plant at Grand Forks, N. Dak. II. Comparison of Small and Large Pilot Plants, by V. F. Parry, D. C. Gernes, E. O. Wagner, J. B. Goodman, and A. W. Koth. 1947, 69 pp., 30 figs. Experimental work just completed by Bureau in a pilot plant at Grand Forks, N. Dak., shows that more than 900 billion tons of lignite in three Western States is a potential source of fuel gas for beneficiating iron ore, making hydrogen, and other industrial uses. Represents first full-scale successful attempt to manufacture water gas from lignite and subbituminous coal by a continuous process in an annular vertical metal retort. Grand Forks gasification pilot plant was put into operation following similar experiments on a smaller scale at a pilot plant at Golden, Colo. Presents details of design, construction, and operation of Golden and Grand Forks pilot plants and draws a comparison between small and large pilot plants. Work done in cooperation with University of North Dakota and Colorado School of Mines.
- †RI 4129. Mount Andrew Iron Deposit, Kasaan Peninsula, Prince of Wales Island, Southeastern Alaska, by W. S. Wright and A. W. Tolonen. 1947. 27 pp., 17 figs. Gives results of an investigation, including trenching, core drilling, and sampling, conducted by Bureau of Mines engineers, of Mount Andrew iron deposit from September 1943 through September 1944.
- RI 4130. Concentration of Oxide Manganese Ore from the Ophir Hill Mine, Ophir, Tooele County, Utah, by S. J. Hussey, T. F. Mitchell, and J. A. McAllister. 1947. 6 pp. Describes and gives results of ore-dressing methods employed to beneficiate ore from Ophir Hill mine. Methods employed were: (1) Washing ore and tabling sized products; (2) combined washing, sink-and-float, and tabling.
- RI 4131. Star Lake Magnetite Deposits, St. Lawrence County, N. Y. (November 1945 to November 1946), by Donald F. Reed and Charles J. Cohen. 1947. 34 pp., 17 figs. (Supplements RI 4127.) Between November 1945 and November 1946 Star Lake area, N. Y., was investigated by extensive ground surveys and core drilling. Summarizes core-drilling operations.
- RI 4132. Recovery of Alumina from Wyoming Anorthosite by the Lime-Soda-Sinter Process, by R. A. Brown, F. J. Cservenyak, R. C. Anderberg, H. J. Kandiner, and F. J. Frattali. 1947. 127 pp., 8 figs. Small-scale laboratory tests supplemented by pilot-plant runs have demonstrated that alumina and soda occurring in Wyoming anorthosite from Laramie Range can be extracted and recovered satisfactorily by lime-soda process. (See also B 465 and RI 4069 and 4299.)
- RI 4133. Concentration of Fluorite Ores from Arizona, California, Idaho, Montana, Nevada, and Wyoming, by J. V. Batty, H. D. Snedden, G. M. Potter, and B. K. Shibley. 1947. 29 pp. Gives results obtained from laboratory studies of fluorite ores submitted from 12 deposits in Arizona, California, Idaho, Montana, Nevada, and Wyoming. Only four of the ores were found to be amenable to beneficiation for production of acid-grade fluorspar concentrates with good recoveries. However, all of the samples were amenable to the production of concentrates meeting chemical specifications for metallurgical-grade spar.
- †RI 4134. Toxicity and Flame Resistance of Thermosetting Plastics, by Lawrence B. Berger, H. H. Schrenk, James A. Gale, Ralph W. Stewart, and Lorenz E. Steffert. 1947. 11 pp., 5 figs. Describes joint investigation conducted by Bureau of Ships, Material Laboratory, New York Naval Shipyard, U. S. Navy Department, and Bureau on testing of insulating plastics. Investigation disclosed that a wide variety of molded and laminated plastic materials used for electrical insulating purposes emit toxic or harmful gases when burned or decomposed by heat in enclosed spaces.
- RI 4135. Some Studies on Emergency Mine Communications, by E. J. Coggeshall, E. W. Felegy, and L. H. Harrison. 1948. 44 pp., 13 figs. Covers more than two decades of Bureau research in development of independent surface-underground communications systems permitting direct contact between mine rescue crews and workers trapped underground by mine disasters. Results of studies showed that low-frequency radio communication offered a distinct possibility of success for emergency use in mines. Low-frequency systems may also be employed in everyday mining operations by utilizing the aid of metallic circuits offered by trolley wires, rails, and pipes.
- RI 4136. Vibrator-Type Multiple-Shot Blasting Unit, by F. C. Gibson and F. W. Brown. 1947. 5 pp., 5 figs. Describes a blasting device known as battery type developed to meet need for a satisfactory permissible multiple-shot blasting device of either battery or generator type.
- †RI 4137. Concentration of Carbonate and Oxide Manganese Ores from the Vicinity of Tracy, Central California, by B. K. Shibley, W. W. Agey, and K. C. Vincent. 1947. 16 pp. Investigation of manganese deposits

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Reports of Investigations

- in vicinity of Tracy, Calif., disclosed that five of eight manganese-ore samples were amenable to production of high-grade manganese concentrates by ore-dressing methods.
- RI 4138. Beneficiation of Oxide and Carbonate Manganese Ores from the Phillipsburg District, Granite County, Mont., by R. R. Wells, A. O. Ipsen, and K. C. Vincent. 1947. 14 pp. All manganese ores from Phillipsburg district, Mont., on which laboratory work was conducted were amenable to production of high-grade metallurgical manganese products marketable with small silica-plus-alumina penalties.
- RI 4139. Concentration of Colorado Fluorite Ores, by J. V. Batty, R. Havens, and R. R. Wells. 1947. 28 pp. Gives results obtained from laboratory ore-dressing studies of fluorite ores from Boulder, Chaffee, Jackson, El Paso, Park, and Gunnison Counties. In general, close mixture of fluorite and gangue prevented production of metallurgical-grade fluorspar by gravity concentration methods. Nevertheless, several ores proved amenable to concentration by flotation methods for production of concentrates containing over 98 percent calcium fluoride and marketable as acid-grade fluorspar.
- RI 4140. Concentration of Oxide Manganese Ores from the Vicinity of Long Valley, Coconino County, Ariz., by C. H. Schack, H. G. Poole, and A. O. Ipsen. 1947. 13 pp. Gives results of metallurgical tests on six lots of ore from Long Valley district, Ariz. All of the ores were beneficiated to a grade containing more than 48 percent manganese.
- RI 4141. Concentration of Manganese Ore from Southeastern Juab County, Utah, by B. K. Shibley and R. Havens. 1947. 11 pp. Ore-dressing tests conducted on three samples taken from properties in southeastern Juab County, Utah, disclosed that none of samples were amenable to ore dressing for production of high-grade manganese sinter.
- RI 4142. Concentration of Manganese Ores from Grand and Emery Counties, Utah, by G. M. Potter, W. G. Sandell, B. K. Shibley, and H. D. Snedden. 1947. 40 pp. Samples from seven manganese properties taken by Bureau engineers in Grand and Emery Counties, Utah, and supplemented with five samples submitted by property owners, were too low grade for producing ferromanganese for steel manufacture.
- RI 4143. Concentration of Utah Fluorite Ores, by H. D. Snedden, J. V. Batty, W. J. Long, and K. C. Dean. 1947. 27 pp. Metallurgical tests were conducted at Salt Lake City Station, Utah, on ore samples from four properties in Washington mining district, two in Star mining district, and one in Wah Wah Mountains, all in Beaver County, and three properties in Tooele County. Describes fluorspar marketing specifications and methods of concentration used in tests, with detailed descriptions of various samples of ore and results of tests conducted with each.
- RI 4144. Akoz Mine, Mariposa County, Calif., by Frank J. Wiebelt. 1947. 6 pp., 3 figs. In 1946 Bureau engineers explored this mine by diamond drilling in an attempt to indicate possible ore extensions that previously had yielded gold, silver, and small quantities of zinc, lead, and copper. Three diamond-drill holes, aggregating 1,097 feet, were drilled.
- RI 4145. Investigation of the Dillsburg Magnetite Deposits, York County, Pa., by G. L. Neumann. 1947. 13 pp., 3 figs. Gives results of investigation of Dillsburg magnetite deposits, York County, Pa. Includes analyses of core samples.
- RI 4146. National Motor-Gasoline Survey, Winter 1946-47, by O. C. Blade. 1947. 38 pp., 3 figs. Results of survey, conducted semiannually in cooperation with Coordinating Fuel Research Committee, indicate that octane ratings of regular and premium-priced gasolines sold during winter of 1946-47 showed an improvement over those of preceding summer. Service-station products of 124 major and minor marketers of motor fuel in 21 marketing areas throughout country were analyzed in survey. Averages are based on analyses of 4,544 individual samples of motor fuels purchased in 282 cities in 40 States and District of Columbia.
- RI 4147. Concentration of Oxide Manganese Ores from the Havasu Lake District, California and Arizona, by R. Havens, G. M. Potter, W. W. Agey, and R. R. Wells. 1947. 18 pp. Metallurgical tests were made on two manganese oxide ores from Arizona Manganese claims, Mohave County, Ariz.; a 2-ton lot of ore from Jones property in same county; a 2-ton lot of low-grade ore from Orchard property on California side of Havasu Lake; and a 2-ton lot of ore from Curtis property, 26 miles north of Bouse, Yuma County, Ariz. Only sample from Arizona Manganese claims was found to be amenable to concentration for production of high-grade manganese products.
- RI 4148. Concentration of Oxide Manganese Ores from the Artillery Peak Deposit, Mohave County, Ariz., by R. Havens, G. M. Potter, and S. J. Hussey. 1947. 16 pp. Extensive metallurgical tests on ore samples taken from Artillery Peak deposit have shown that these complex, low-grade ores are not readily amenable to ordinary ore-dressing methods.
- RI 4149. Concentration of Oxide Manganese Ore from Sheep Mountain Property, Durkee District, Oreg., by R. R. Wells and W. W. Agey. 1947. 7 pp., High silica content of Sheep Mountain ores prevented production of marketable concentrates by ore-dressing methods. Intermediate-grade concentrates were produced by gravity treatment.
- †RI 4150. Investigation of Coal Deposits for Local Use in the Arctic Regions of Alaska and Proposed Mine Development, by Albert L. Toenges and Theodore R. Jolley. 1947. 19 pp., 10 figs. Enough coal to meet increasing demands of Eskimo villages and Government schools and hospitals along Arctic Coast of Alaska can be produced locally, by (1) developing local sources of coal at points nearest each village or group of villages, or (2) developing single source of coal, stock-piling coal on Arctic Coast in winter, and moving it to various villages by barge in summer. Discusses advantages and disadvantages of each plan and describes various coal beds examined and characteristics of coal found in each.
- RI 4151. Specific Heat of Colorado Oil Shales, by R. J. Shaw. 1947. 9 pp., 4 figs. Average specific heats were determined for five samples of Colorado oil shale ranging in oil yield from 1 to 89.2 gallons per ton and for two samples of spent shale obtained by retorting two raw oil-shale samples. Methods and equipment employed are described in detail, and results are expressed both in tables and graphs. Work done in cooperation with University of Wyoming.
- RI 4152. Andover-Sulphur Hill Iron Mines, Sussex County, N. J., by Victor J. Lynch. 1947. 12 pp., 4 figs. In 1942 Bureau of Mines explored this property by dip-needle surveying and diamond drilling. Six drill holes, totaling 1,387 feet, were drilled, two holes at Andover mine and four holes at Sulphur Hill mine.
- †RI 4153. Pilot-Plant Distillation and Purification of Titanium Tetrachloride, by C. Kerby Stoddard and Emil Pietz. 1947. 40 pp., 5 figs. Discusses pilot-plant distillation and purification of titanium tetrachloride and gives results of laboratory tests.
- RI 4154. Electronic Control Unit for Cathode-Ray Oscillograph Recording of Transients Arriving at Indeterminate Times, by S. L. Windes. 1947. 8 pp., 8 figs. Describes control unit with its method of operation and examples of its use in recording underground disturbances. Bibliography included.
- RI 4155. Investigation of the Iron-Bearing Formation of the Western Gogebic Range, Iron County, Wis., by Paul Zinner and Clyde L. Holmberg. 1947. 48 pp., 11 figs. Bureau excavated five trenches covering a 2-mile area in this Wisconsin iron range and obtained 108

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- samples. More than 100,000,000 tons of iron-bearing ore in area could be mined by open-cut methods. Metallurgical tests on samples at Rolla, Mo., indicated that recovery of iron in a marketable-grade concentrate was generally low.
- RI 4156. Boy Scout-Jones and Moss-Richardson Molybdenum Deposits, Halifax County, N. C., by A. F. Robertson, F. K. McIntosh, and T. J. Ballard. 1947. 9 pp., 16 figs. In 1943, 1944, and 1946 Bureau explored molybdenum deposits in Halifax County through trenching and diamond-drilling. Of 1,447 drill samples from 32 holes, 309 were tested; 30 trench samples also were collected. Detailed information on diamond-drill holes and metallurgical tests are included.
- RI 4157. Electrolytic Manganese in Acid and Basic Electric Steel Foundry Practice and Basic Steel Ingot Production, by F. Sillers, Jr., R. T. C. Rasmussen, and J. H. Jacobs. 1947. 24 pp. Tests conducted by Bureau and six American plants have proved that Bureau-developed electrolytic manganese can be used satisfactorily in acid- and basic-steel foundry practice and steel-ingot production. Tests were made with electrolytic manganese extracted from low-grade domestic ores. Four reports on similar tests have been published. Contains detailed information, in form of heat records and physical properties, about each of tests covered.
- RI 4158. Laboratory Beneficiation of Disseminated Fluorspar Ores, by M. M. Fine and R. G. O'Meara. 1947. 19 pp., 2 figs. One company in Illinois and two in Colorado, interested in producing acid-grade fluorspar, sent samples of concentrates for examination and crude ore for metallurgical testing to Rolla, Mo., Station. Investigation was on a small laboratory scale, no pilot-plant tests being made. Describes in detail methods used and results attained with each sample.
- RI 4159. Concentration of Gravity Tailings from the Grasselli Deposit, Park City, Utah, by T. F. Mitchell, W. G. Sandell, G. M. Potter, B. K. Shabler, and J. V. Batty. 1947. 18 pp., 2 figs. Summarizes results of laboratory ore-dressing studies made on samples from the Grasselli deposit.
- RI 4160. Washability Studies of the Clark and Gholson Coal Beds at Boothton, Ala., by B. W. Gandrud and H. L. Riley. 1947. 11 pp., 20 figs. Describes washability tests on run-of-mine coal from the Clark and Gholson beds at Boothton, Ala. Work done in cooperation with University of Alabama.
- RI 4161. Mississippi Valley Experiment Station Laboratory and Pilot-Plant Concentration of Corundum from Gallatin Gateway, Mont., for World War II, by W. A. Calhoun and R. G. O'Meara. 1947. 27 pp. Concentration tests on Montana corundum ore, conducted by Bureau in closing month of World War II, yielded some high-grade concentrates suitable for industrial use. Concentrates ranged in corundum content from 65.5 to 93.8 percent. Contains detailed technical data on each test.
- RI 4162. Gibellini Manganese-Zinc-Nickel Deposits, Eureka County, Nev., by E. O. Binyon. 1948. 9 pp., 5 figs. In 1946 Bureau engineers investigated the Gibellini manganese-zinc-nickel deposits in Eureka County, Nev., by diamond drilling. Six holes totaling 1,198.5 feet were drilled. No trenching or other exploratory work was done.
- †RI 4163. Electrowinning of Manganese from Domestic Ores, by J. H. Jacobs. 1947. 19 pp. Describes successful production of electrolytic manganese from native low-grade ores of New Mexico, Arkansas, Nevada, Montana, California, Arkansas, and South Dakota.
- RI 4164. Experiment in Underground Gasification of Coal, Gorgas, Ala., by James J. Dowd, James L. Elder, J. P. Capp, and Paul Cohen. 1947. 62 pp., 44 figs. Reports underground gasification experiment conducted in Pratt coal bed, Gorgas, Ala., in cooperation with Alabama Power Co. Three outstanding results were:
- (1) There was no difficulty in maintaining combustion of coal underground; it was possible to stop active combustion at conclusion of test and then to cool underground residue to examine it;
  - (2) coal in place can be completely gasified, as final examination of underground residue showed coal in place can be completely consumed;
  - (3) high temperature developed by gasification of coal in place brought about changes in overlying strata that in this case appear to be very favorable to gasification process.
- RI 4165. A Mine Air-Conditioning Chart, by G. E. McElroy. 1947. 23 pp., 7 figs. Describes an unusual mine air-conditioning chart embodying features of usual air-conditioning charts but modified to compensate for changes in elevation. The new chart permits quick determination of psychrometric data and rapid solution of mine air-conditioning problems. A 7½- by 6-inch reproduction of the new chart, with an explanation and examples of its use, is included.
- †RI 4166. Flotation of Beryllium Ores, by J. S. Kennedy and R. G. O'Meara. 1948. 18 pp. Investigation of concentration of beryllium ores was undertaken by Bureau. Although various concentration methods were adaptable for removing minor amounts of certain accessory minerals, flotation was the most applicable method. Discusses flotation procedure.
- RI 4167. Sulfur in Low-Gravity Fractions of Some Bituminous Coals, by Thomas Fraser and William L. Crentz. 1947. 6 pp., 4 figs. Bureau scientists at the Central Experiment Station, Pittsburgh, Pa., subjected light, small particles of bituminous coal taken from several of the Nation's larger coal beds to float-and-sink separation tests. Results of tests showed that washing of smaller-than-average coal fragments facilitated removal of the freer, coarser sulfur particles but did not successfully remove the organic sulfur.
- RI 4168. Mirror Harbor Nickel Deposits, Chichagof Island, Alaska, by W. M. Traver, Jr. 1948. 13 pp., 10 figs. Describes investigation of Mirror Harbor nickel deposits, Chichagof Island, Alaska. Discusses climate, geology, location and accessibility, and history and production of the Mirror Harbor area, and contains topographic and assay maps. Gives analyses of core samples.
- RI 4169. Investigations of Explosion Hazards of Perchloric Acid and Mixtures of Perchloric Acid and Organic Materials, by M. A. Elliott and F. W. Brown. 1948. 17 pp., 1 fig. Summarizes results of tests made to determine sensitivity of mixtures of perchloric acid and oxidizable materials to initiation by heat, impact, sparks, flame, and explosive impulses.
- RI 4170. Lead, Zinc, Silver, Copper, Bismuth Deposits, South Hecla Mine, Alta, Salt Lake County, Utah, by John I. Kasteler and John H. Hild. 1948. 8 pp., 7 figs. Early in 1943 Bureau began to investigate South Hecla mine. Nine diamond-drill holes were drilled. During 1944 and 1945 leasers mined and shipped 548 dry tons of ore from which lead, copper, bismuth, antimony, silver, and gold were produced. Tables showing results of tests and maps and diagrams of area examined are included.
- RI 4171. Résumé of Bureau of Mines Research and Development Work on Western Coals, 1942-47, by V. F. Parry. 1948. 9 pp., 8 figs. Describes Bureau of Mines investigation of western coals for the 6-year period, 1942-47, which was begun by Bureau to help supply coal and coke needs of growing western steel industry. One result was discovery of two extensive beds of coking coal. Investigation included study of carbonizing properties of western coals, storage of coal, drying of low-rank fuels, and combustion of low-rank coals. List of publications prepared at the Golden, Colo., Station is included.
- RI 4172. Electrowinning of Cobalt from Cobaltite Concentrates, by F. K. Shelton, J. C. Stahl, and Ruth E. Churchward. 1948. 98 pp., 8 figs. Describes a com-

Reports of Investigations

- mercially feasible process developed by Bureau for producing electrolytic cobalt from domestic low-grade ores. Flow sheets covering operation of a 2-ton-a-day commercial plant, as well as an estimate of the cost of constructing and operating a large-scale production unit, are given. Contains detailed descriptions of construction, equipment, and operation of Boulder City, Nev., pilot plant and presents latest available information on every phase of Bureau research in the electrolytic production of cobalt during past several years.
- RI 4173. Antimony Deposits in Alaska, by Norman Ebbley, Jr., and Wilford S. Wright. 1948. 41 pp., 23 figs. In 1942 Bureau investigated Stampede antimony deposit, excavating six trenches, and Slate Creek antimony prospect, excavating five trenches. Other Alaskan antimony deposits investigated were My Creek, Tok River, Black Rapids, Ridge Claim, Wiseman, Caamano Point, and Black Mountain deposits.
- †RI 4174. Tungsten Deposits in Alaska, by Robert L. Thorne, Neal M. Muir, Aner W. Erickson, Bruce I. Thomas, Harold E. Heide, and Wilford S. Wright. 1948. 51 pp., 22 figs. Bureau engineers investigated three tungsten properties in Gilmore Dome area, 16 miles northeast of Fairbanks, and two properties in Hyder district, at the head of Portland Canal in southeastern Alaska, between June 1924 and October 1944. Detailed maps, geological data, and results of beneficiation tests of ore samples are included.
- RI 4175. Geophysical Investigation of Manganiferous Iron Deposits, Boston Hill, Grant County, N. Mex., by H. R. Joesting, L. O. Bacon, and J. H. Getz. 1948. 12 pp., 14 figs. In 1945 geophysical surveys were made on Boston Hill to determine if hitherto undiscovered manganiferous iron deposits existed. Results of the surveys are given.
- †RI 4176. Annual Report of Research and Technologic Work on Explosives, Explosions, and Flames, Fiscal Year 1946, by Bernard Lewis. 1947. 62 pp., 43 figs. Describes studies by Explosives Division in fiscal year 1946 on explosives research, flame and combustion research, chemical and physical tests on explosives, flammability of gases and vapors, and dust explosions at the Experimental coal mine. Experimental mine serves as a large-scale testing laboratory.
- RI 4177. Development of a Successful Hard-Surfaced Bit for Drilling Oil Shale, by Tell Ertl, John R. Wagner, Jr., and Ernest E. Burgh. 1948. 8 pp., 3 figs. Outlines development of a successful hard-surfaced rock bit for drilling oil shale, a tough homogeneous rock. Expenses are reduced, and greater efficiency is produced in drilling.
- RI 4178. Georgia Iron Deposits, Cherokee, Bartow, Floyd, and Polk Counties. Part I, by Walter T. Lewicki. 1948. 28 pp., 18 figs. Describes churn-drilling and test-pitting operations conducted by Bureau engineers on 13 iron-bearing properties, as well as history and production, physical features, and geology of the area. Includes numerous topographic and assay maps.
- †RI 4179. Georgia Iron Deposits, Cherokee, Bartow, Floyd, and Polk Counties. Part II, by A. F. Robertson. 1948. 42 pp., 5 figs. Describes drilling projects conducted on four properties between June and September 1945. Includes analyses of ore samples collected during the ore studies and detailed logs of the drilling operations.
- †RI 4180. Correll Zinc Mine, Lehigh County, Pa., by Clyde B. White and James E. Bell. 1948. 8 pp., 2 figs. During 1943 and 1944 Bureau drilled five diamond-drill holes at the abandoned Correll mine on possibility that more zinc ore might be found in limestone beds below known deposits. Cores were subjected to metallurgical tests and results are shown in tables. Includes map of the area and a property map.
- RI 4181. Lead and Zinc Deposits of the Treasure Hill Mines, Ophir Mining District, Tooele County, Utah, by W. C. Dunham and F. H. Gunnell. 1948. 25 pp., 9 figs. In 1945, 1946, and 1947 Bureau explored this property by diamond drilling and drifting and cross-cutting. Results of diamond drilling are given in appendices.
- †RI 4182. Yakobi Island Nickel Deposit, Sitka Mining District, Alaska, by J. H. East, Jr., W. M. Traver, Jr., R. S. Sanford, and W. S. Wright. 1948. 28 pp., 22 figs. In 1941 and 1942, 15 core-drill holes, totaling 5,191 feet, were completed by the Bureau. In all, 467 core samples and 113 pit and tunnel samples were shipped to Bureau's laboratory at Reno, Nev., for analysis, and more than a ton of ore to Bureau's laboratory at Salt Lake City, Utah, for metallurgical testing.
- RI 4183. Elimination of Iron in Ammonium Sulfate Process for Production of Alumina from Clay, by A. T. Sweet and G. Douglas Gardner. 1948. 13 pp. Discusses removal of iron by ore-dressing methods and from leach liquors. Of the various methods investigated of removing iron in ammonium sulfate process for production of alumina from clay, the most satisfactory was addition of calcined clay in leaching step.
- RI 4184. Effects of Moisture on Float-and-Sink Testing of Lignite, by H. M. Cooper, E. C. Tarpley, and R. F. Abernethy. 1947. 8 pp., 4 figs. Gives results of tests made to determine effect of moisture on float-and-sink testing of lignite.
- RI 4185. Concentration of Urania Tin-Tungsten Ore from Bolivia, South America, by G. M. Potter and W. G. Sandell. 1948. 10 pp., 1 fig. Beneficiation studies were made on a 100-pound sample of complex tin-tungsten ore from the Urania mine in Bolivia, South America. Describes methods of concentrating this ore.
- RI 4186. Concentration of Lake Valley Mines Oxide Manganese Ore from Deming, N. Mex., by K. C. Dean, H. G. Iverson, and J. A. McAllister. 1948. 8 pp. Laboratory concentration studies were conducted at Salt Lake City Station on a sample of ore from Lake Valley mines at Deming, N. Mex. Gives results of these studies.
- RI 4187. Determination of Carbon Monoxide by Absorption in the Haldane-Type Gas-Analysis Apparatus, by L. B. Berger. 1947. 6 pp., 5 figs. Describes a method for the gas-volumetric determination of carbon monoxide in concentrations (0.2 to 0.5 percent) that are difficult or troublesome to determine with accuracy by certain other analytical procedures.
- †RI 4188. Sidney Mine, Pine Creek Area, Shoshone County, Idaho, by Robert M. Gammell and Robert J. Hundhausen. 1948. 11 pp., 7 figs. During 1943 and 1944 Bureau of Mines completed 13,800 linear feet of angledozer trenching and 2,670 linear feet of diamond drilling at the Sidney mine.
- RI 4189. Cle Elum Iron-Nickel Deposits, Kittitas County, Wash., by S. W. Zoldok. 1948. 8 pp., 4 figs. During 1943 and 1944 Bureau drilled 57 vertical holes, totaling 11,219 feet, from surface stations. Four hundred and forty-six diamond-drill samples were taken for assay purposes. In addition, approximately 15 tons of ore were shipped to metallurgical laboratory at Salt Lake City, Utah, and 17 tons to metallurgical laboratory at Albany, Oreg., for test purposes.
- †RI 4190. Studies on Methods for Recovering Scrap Mica from Pegmatite of the Black Hills, South Dakota, by Gerald A. Munson and Fremont F. Clarke. 1948. 26 pp., 19 figs. Mica in the pegmatites of the Black Hills occurs invariably as dense, compact blocks in a matrix of undecomposed igneous rock. Discusses methods for recovering scrap mica from pegmatite of the Black Hills. Includes bibliography.
- RI 4191. A Process for the Production of Iron-Free Alum. Part I. Laboratory Development, by Edwin A. Gee and W. K. Cunningham. 1948. 27 pp., 14 figs. Discusses phase relations and solubility measurements,

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- analytical and control methods, alternate purification procedures, purity of product, yield, nature of product, drying, characteristics of solvent, thermal data, and materials of construction. Summarizes laboratory development of process for production of iron-free alum. (See also RI 4351.)
- †RI 4192. Stress Analysis Applied to Underground Mining Problems. Part I. Stress Analysis Applied to Single Openings, by Wilbur L. Duvall. 1948. 18 pp., 16 figs. First in a series of reports on application of stress analysis to underground mining problems, publication deals only with single mine openings. (See also RI 4387.)
- RI 4193. Oil-Well Reconditioning in Southwestern Pennsylvania, West Virginia, and Southeastern Ohio, by Bruce F. Grant. 1948. 82 pp., 26 figs. Oil-well reconditioning methods used in three sections of the Appalachian region which have similar reservoir characteristics, production practices, and operating procedures are described. Southwestern Pennsylvania, West Virginia, and southeastern Ohio are the areas covered in the survey.
- †RI 4194. Damping Capacity of Metals, by E. V. Potter. 1948. 48 pp., 23 figs. Discusses methods for determining the capacity of metals to absorb vibrational energy and convert it into heat—called the damping capacity of metals. Includes bibliography.
- RI 4195. Tests in the Experimental Coal Mine Determine Requirements for Preventing Propagation of Coal-Dust Explosions in Rooms, by H. C. Howarth, John Nagy, Irving Hartmann, H. P. Greenwald, and Bernard Lewis. 1948. 12 pp., 17 figs. Gives results of a series of tests made by Bureau of Mines at its Experimental mine at Bruceton, Pa., to determine adequacy of Safety Code's rock-dusting provisions.
- RI 4196. Effect of Hydrocarbons and Other Gases Upon the Explosibility of Acetylene, by G. W. Jones, R. E. Kennedy, and I. Spolan. 1948. 8 pp., 1 fig. Acetylene under pressure can be rendered nonexplosive and handled safely if mixed in proper proportions with certain hydrocarbons or other gases. Natural gas, propane, and butane are among the hydrocarbon gases suitable for mixing with acetylene, but carbon dioxide, nitrogen, helium, and hydrogen also render acetylene under pressure less explosive. A summary of the results of an investigation of pressures ranging from atmospheric to 100 pounds per square inch gage is included.
- RI 4197. Heating-Value Loss of Coal on Air-Drying, by H. M. Cooper, E. C. Tarpley, and R. F. Abernethy. 1948. 6 pp. Series of tests were made on coals of several ranks to evaluate the degree of oxidation, or loss of heating value, caused by air-drying according to standard practice. Results for air-drying loss, moisture at 105° C., dry mineral-matter-free B. t. u., and percent loss of B. t. u. obtained from these tests are given.
- RI 4198. Spectrochemical Determination of Nickel in Electrolytic Cobalt Using a Current-Regulated Direct-Current Arc, by Clyde A. Bridger and Graham W. Marks. 1948. 7 pp., 2 figs. An electrolytic process for preparation of metallic cobalt has been developed recently in Bureau of Mines Experiment Station at Boulder City, Nev. Chemical analysis shows this cobalt to contain impurities in small percentages, chief of which is nickel. Describes procedure for the spectrochemical determination of nickel in cobalt.
- RI 4199. Reduction of Phosphorus Content in Iron Ore and Concentrate from Iron Mountain, Mo., by H. Kenworthy. 1948. 20 pp. Describes investigations conducted by Bureau to determine most effective methods of reducing phosphorus content of iron ores and concentrates from Iron Mountain, Mo.
- RI 4200. Preparation Characteristics of Anthracites in the Santa River Valley, Peru, by Thomas Fraser. 1948. 31 pp., 30 figs. Anthracite from beds being developed in the Santa River Valley of northern Peru closely resembles that found in Pennsylvania and is an important factor in the proposed industrial and agricultural development of the valley. A Bureau technical mission visited the area in 1945 to study methods by which coal could best be prepared for local industrial use and general marketing. Experimental work by the mission is described, and test data are presented and interpreted. Recommendations and conclusions with regard to handling coal in mines and preparation plants, preparation of commercial coal, rescreening at the destination, preparation of anthracite for metallurgical use, and the problem of fine coal are presented.
- RI 4201. Bucket-Drilling the Coso Mercury Deposit, Inyo County, Calif., by Leon W. Dupuy. 1948. 45 pp., 16 figs. Describes successful adaptation and use of a rotary-bucket drill rig in exploring mercury deposits in California. This method was used because the ore occurs in an area of active hot springs and varies in hardness from a soft, mushy, claylike substance to hard, compact opal; the moisture, with the softness of some of the material, made diamond drilling inadvisable.
- RI 4202. G. S. Stiner Zinc Prospect, Union County, Tenn., by Robert C. Hickman. 1948. 2 pp., 2 figs. In 1947 two holes, totaling 421.2 feet, were drilled on the G. S. Stiner zinc prospect, in the Lead Mine Bend area of Union County, Tenn.
- RI 4203. Cline Copper and Tungsten Mine, Cabarrus County, N. C., by Robert C. Hickman. 1948. 5 pp., 2 figs. In 1946 Bureau drilled four diamond-drill holes, totaling 636.5 feet, at the Cline copper and tungsten mine, Cabarrus County, N. C. Analyses of core samples and logs of drill holes are included.
- RI 4204. Howard Lynch Zinc Prospect, Claiborne County, Tenn., by Robert C. Hickman. 1948. 3 pp., 2 figs. In 1947 Bureau engineers drilled three diamond-drill holes, totaling 455 feet, on the Lynch property.
- RI 4205. Station-Curnel Fluorspar Prospect, Crittenden County, Ky., by Robert C. Hickman. 1948. 4 pp., 2 figs. Bureau in 1946 explored the Crittenden County, Ky., fluorspar prospect by diamond-drilling five holes totaling 1,595.8 feet.
- RI 4206. D. W. Harris (O'Dell) Zinc Prospect, Claiborne County, Tenn., by Robert C. Hickman. 1948. 3 pp., 2 figs. In March and April 1947 Bureau drilled five holes, totaling 535.3 feet, on the Harris property—the only active zinc mine in the entire Powell River area.
- RI 4207. Margerum Bauxite District, Colbert County, Ala., by Don M. Coulter. 1948. 10 pp., 3 figs. In 1943 Bureau investigated this property by churn and hand-auger drilling and taking drive-pipe samples.
- RI 4208. Titanium Minerals in Trail Ridge, Fla., by Robert V. Spencer. 1948. 21 pp., 19 figs. Drilling was conducted by Bureau in 1946 and 1947 in a dune area known as Trail Ridge. Two hundred and forty-three holes were completed, and 1,622 samples were obtained. (See also RI 4227.)
- RI 4209. BeVan Quartz-Crystal Prospect, Lemhi County, Idaho, by J. A. Herdlick. 1948. 6 pp., 2 figs. In 1943 and 1944 Bureau investigated this Idaho prospect in the Indian Creek mining district, as quartz crystals possess certain electric properties suitable for wartime communications, detection, and control devices. The quartz crystals were examined and classified at Bureau's College Park, Md., laboratory and checked at National Bureau of Standards, Washington, D. C.
- RI 4210. Black Rock Tungsten Deposit, Mono County, Calif., by Leon W. Dupuy. 1948. 6 pp., 10 figs. Bureau investigated Black Rock tungsten mine in California by hand and bulldozer trenching and channel sampling. Topographic, contour, and assay maps of the Black Rock mine are included.
- RI 4211. Trego Lead-Zinc Mine, Grant County, Wis., by Alvin M. Cummings. 1948. 8 pp., 2 figs. During 1943

Reports of Investigations

- Bureau drilled eight churn-drill holes on the Trego property. Results of drilling and sampling operations are given.
- RI 4212. Dubuque Lead-Zinc District, Iowa, by Francis C. Lincoln. 1948. 7 pp., 2 figs. In 1944 Bureau engineers investigated the Pikes Peak and Durango areas of the Dubuque lead-zinc district by diamond and churn drilling.
- RI 4213. Ione-Carbondale Clays, Amador County, Calif., by F. T. Johnson and Spangler Ricker. 1948. 6 pp., 3 figs. Bureau explored the Ione-Carbondale clays area in California in 1942. Seventy holes, totaling 8,837 feet, were drilled. Charts showing cross sections of the deposits are included.
- RI 4214. Antier Copper-Zinc Deposit, Mohave County, Ariz., by T. M. Romalo. 1948. 14 pp., 9 figs. In 1947 Bureau explored this property by diamond drilling. Six holes were drilled, totaling 2,282 feet.
- RI 4215. Belle Eldridge Lead-Zinc Deposits, Lawrence County, S. Dak., by Vernon C. Davis. 1948. 8 pp., 2 figs. In 1943 Bureau drilled six holes at the lead-zinc deposits of the Belle Eldridge Gold Mines, Inc., in Lawrence County, S. Dak., by diamond drilling.
- RI 4216. Beryl Mountain, Sullivan County, N. H., by S. B. Levin. 1948. 3 pp., 2 figs. In 1943 Bureau investigated beryl on Beryl Mountain by surface cuts, trenching, and tunneling.
- RI 4217. Silver Spot Manganese-Iron-Zinc Deposits, Grant County, N. Mex., by John H. Soulé. 1948. 5 pp., 4 figs. In April 1947 Bureau inaugurated a diamond-drilling project to determine the extent of lead-zinc mineralization which had been found during earlier investigations of the Silver Spot property. One hole was drilled to a depth of 633.2 feet before the project was terminated because of lack of funds and time. An assay log of the drilling operations and a topographic map of the property are included.
- †RI 4218. Flocculation of Aerosols by Intense High-Frequency Sound, by H. W. St. Clair, M. J. Spendlove, and E. V. Potter. 1948. 28 pp., 18 figs. Describes sonic flocculator, flocculation tests, and method of conducting batch flocculation tests. Gives measurement of density of aerosol and degree of flocculation.
- †RI 4219. Southwestern North Dakota Clay Deposits, Stark, Slope, and Billings Counties, N. Dak., by Fremont F. Clarke. 1948. 32 pp., 9 figs. Four principal areas of bentonitic clays, comprising 6,967 acres in Stark, Slope, and Billings Counties, N. Dak., were mapped and sampled by Bureau exploratory crews. In all, 103 trenches having a cumulative length of 5,375 feet were excavated, and 417 samples were collected for beneficiation and other tests.
- RI 4220. Effects of Sheaths on Gaseous Products from Permissible Explosives. II, by E. J. Murphy. 1948. 57 pp., 9 figs. Bureau chemists tested 16 permissible explosives with and without sheaths in two types of laboratory equipment. Describes permissible explosives used, apparatus and testing procedure, and effects of oxygen balance and weight ratio of sheath to explosives on the various gaseous products, including carbon monoxide, oxides of nitrogen, hydrogen sulfide, carbon dioxide, and hydrogen. (See also RI 3705.)
- RI 4221. Stone Hill Copper Mine, Cleburne and Randolph Counties, Ala., by Hugh D. Pallister and J. R. Thoenen. 1948. 29 pp., 6 figs. Bureau explored the Stone Hill copper mine by diamond-drilling eight holes.
- RI 4222. Preparation and Carbonization Characteristics of Low-Volatile Coal from Oyón Region of Peru, by Thomas Fraser and J. D. Davis. 1948. 9 pp., 2 figs. Lists composition and carbonizing properties of low-volatile coal from Oyón field in Peru.
- RI 4223. Bauxite in Cherokee and Calhoun Counties, Ala., by Don M. Coulter. 1948. 28 pp., 15 figs. During 1942 and 1943, 222 holes were drilled in three districts in Cherokee and Calhoun Counties, Ala. Total footage drilled was 13,250 feet. Drilling operations in each district are described; and maps supplement the text, with tables showing results of metallurgical tests on samples collected.
- RI 4224. Penn Mine Slag Dump and Mine Water, Calaveras County, Calif., by Frank J. Wiebelt and Spangler Ricker. 1948. 6 pp., 2 figs. During September and October 1942 Bureau engineers investigated possibility of recovering zinc and copper from the Penn mine slag dump and water. Gives results of metallurgical tests and water-sampling operations.
- RI 4225. Certain Magnetite Deposits in New Jersey, by G. L. Neumann and McHenry Mosier. 1948. 34 pp., 8 figs. Describes magnetic surveys and diamond drilling of magnetite iron-ore deposits conducted by Bureau in New Jersey. In 1945 and 1946 Bureau diamond-drilled 18 holes, excavated 6 test pits, and rehabilitated 3 tunnels extending 680 feet.
- RI 4226. Investigation of Coker and Bickford Zinc Deposits, Iowa County, Wis., by Francis C. Lincoln. 1948. 20 pp., 3 figs. Between 1942 and 1944 Bureau sampled lead and zinc tailing piles at the Coker mines and explored the Coker and Bickford properties by churn drilling. Includes analyses of churn-drill samples.
- †RI 4227. Drilling Florida Dune Sand, by J. R. Thoenen and Robert V. Spencer. 1948. 4 pp., 6 figs. Describes methods used in a drilling investigation conducted by Bureau of an ancient dune area in northeast Florida known as Trail Ridge. RI 4208, Titanium Minerals in Trail Ridge, Fla., describes the investigation by drilling of the dune area.
- RI 4228. Copper Flat Zinc Deposit, Central Mining District, Grant County, N. Mex., by Donald H. Mullen and Walter R. Storms. 1948. 8 pp., 5 figs. Bureau engineers in 1946 and 1947 explored the Copper Flat deposit by drilling four holes. The project was designed to determine existence of lead-zinc deposits below the level of existing workings. Gives results of study.
- RI 4229. North Alabama Brown Iron Ores, by Andrew Brown. 1948. 82 pp., 33 figs. Seeking a more efficient method of examining the brown-iron-ore deposits, Bureau studied several drilling techniques to replace the inadequate ones being used. A rotary core drill—formerly successful in drilling bauxite—proved far superior to any other type in use. Various types and sizes of bits and core barrels are described. Maps, photographs, and detailed results of the drilling are included.
- RI 4230. Camp Bird Lead-Zinc Deposits, Ouray County, Colo., by E. V. Deshayes and W. E. Young. 1948. 19 pp., 4 figs. Seven diamond-drill holes, totaling 3,956 feet, were drilled in the Camp Bird lead-zinc deposits. Maps of underground workings and detailed logs of drilling operations are given.
- RI 4231. Yancey-Crawford Manganese Deposit, Rockingham County, Va., by M. H. Kline and Wing G. Agnew. 1948. 5 pp., 5 figs. In 1941 Bureau explored the Yancey-Crawford manganese deposit by drilling. Five drill holes were sunk.
- RI 4232. Watson Manganese Deposit, Page County, Va., by M. H. Kline and Wing G. Agnew. 1948. 10 pp., 9 figs. In 1941 Bureau explored the Watson mine. Fifteen holes were drilled, ranging in depth from 77 to 298 feet.
- †RI 4233. Diamond Drilling and Diamond Bit Investigation. Part 2. Tests on Cast-Set Coring Bits, by Leonard Obert, Wing G. Agnew, Alton Gabriel, Felix Chayes, and Albert Long. 1948. 12 pp., 1 fig. One in a series of publications on diamond drilling and diamond bit investigations, this publication describes results of performance tests of various commercial bits in granite, with a discussion of break-in procedures and the effect of the bit load on the type and degree of wear on different size and grades of diamonds. (See also RI 4041.)
- RI 4234. Edison Spodumene Mine, Pennington County, S. Dak., by Fremont F. Clarke, Paul Zinner, and

†Out of print.

- others. 1948. 23 pp., 9 figs. In 1944 and 1945 core drilling and sampling were done by Bureau crews. Thirteen diamond-core-drill holes, aggregating 2,114.5 feet, were drilled, and 26 channel and 13 miscellaneous samples were collected and analyzed.
- RI 4235. Bauxite deposits in Union and Pontotoc Counties, Miss., by Don M. Coulter. 1948. 8 pp., 9 figs. In 1943, 97 holes were drilled in Union and Pontotoc Counties, Miss. Drilling operations are described.
- RI 4236. Iron Mountain Deposits, San Bernardino County, Calif., by Frank J. Wiebelt and Spangler Ricker. 1948. 11 pp., 8 figs. Exploration of Iron Mountain deposits by Bureau was completed in March 1944. Twelve diamond-drill holes, totaling 1,620 feet, were drilled. The property was acquired by Kaiser Co., Inc., as a potential iron-ore reserve for its Fontana steel plant.
- RI 4237. West Pinos Altos Zinc-Lead Deposits, Grant County, N. Mex., by John H. Soule. 1948. 8 pp., 5 figs. In 1946 and 1947 a total of 1,824.2 feet was diamond-drilled by the Bureau in the West Pinos Altos district.
- RI 4238. An Investigation of a Laboratory Test for Determination of the Free-Swelling Index of Coal, Revision of R. I. 3989, by W. A. Selvig and W. H. Ode. 1948. 11 pp., 6 figs. A convenient method for obtaining free-swelling indexes of coals whose coke buttons do not conform to any of the standard profiles is described in this publication, a revision of R. I. 3989. A curve has been prepared showing relationship of the areas of the standard profiles to their corresponding swelling-index numbers. An appendix discussing a small-scale laboratory test for obtaining information regarding the free-swelling properties of a coal is included; the results may be used as an indication of the coking characteristic of the coal when burned as a fuel. This test is not recommended as a method for the determination of expansion of coals in coke ovens.
- RI 4239. Georgia Mica Spots, Cherokee, Upson, Lamar, and Monroe Counties, by William A. Beck. 1948. 29 pp., 20 figs. In 1944 and 1945 Bureau explored five mica-bearing properties in Georgia by diamond drilling—the Amphlett mine in Cherokee County, the Mitchell Creek and Stevens-Rock mines in Upson County, the Battle mine in Monroe County, and the Early Vaughn mine in Lamar County. Detailed logs of the drilling operations, as well as numerous maps and photographs of the properties discussed in the text, are given in appendix.
- RI 4240. Ahles Iron Mine, Warren County, N. J., by John R. Troxell. 1948. 8 pp., 3 figs. In 1944 Bureau diamond-drilled two holes, totaling 1,474 feet, under the old workings at the Ahles iron mine.
- RI 4241. North Carolina Mica Spots, Mitchell, Macon, Gaston, and Yancey Counties, by L. A. Dahners and F. K. McIntosh. 1948. 16 pp., 10 figs. Bureau explored four mica properties by drilling—the Buchanan mine in Mitchell County, the Beasley No. 2 mine in Macon County, the Presnell mine in Yancey County, and the Bess mine in Gaston County. Logs of drilling operations are given in appendix.
- RI 4242. A Spectroscopic Method for the Determination of Absorption Coefficients, by Graham W. Marks and Harold C. Lukens. 1948. 8 pp., 3 figs. Shows how an ordinary grating spectrograph when used in conjunction with a standard spectral light source can be used for determining the absorption coefficients of a material throughout the spectral range of the instrument.
- RI 4243. Alabama Red Iron Ores, Greasy Cove and Shinbone Ridge, St. Clair and Etowah Counties, by J. R. Thoenen and J. D. Warne. 1948. 35 pp., 10 figs. During 1946 and 1947 Bureau explored the Greasy Cove area by diamond-drilling three holes, totaling 2,159 feet, and the Shinbone Ridge area by diamond-drilling three holes, totaling 3,447 feet.
- RI 4244. Exothermal Decomposition of Mixtures Containing Ammonium Nitrate, by Martin A. Elliott. 1948. 11 pp., 9 figs. Tests to determine the temperature at which ammonium nitrate mixed with certain contaminants would react rapidly were conducted with mixtures of ammonium nitrate and compressor oil and ammonium nitrate and zinc with and without oil. Results of tests are presented.
- RI 4245. Explosions of Ammonium Nitrate Fertilizer on Board the S. S. *Grandcamp* and S. S. *High Flyer* at Texas City, Tex., April 16, 17, 1947, by G. M. Kintz, G. W. Jones, and Charles B. Carpenter. 1948. 57 pp., 43 figs. Results of preliminary tests on samples of ammonium nitrate fertilizer and observations of Bureau of Mines engineers who assisted in an investigation of explosions of this material in the holds of the S. S. *Grandcamp* and S. S. *High Flyer* in April 1947 in the Texas City, Tex., harbor are described.
- RI 4246. Laboratory Study of the Hot-Water Process for Separating Hydrocarbons from Surface Deposits of Bituminous Sandstones Near Edna, Calif., by G. B. Shea and R. V. Higgins. 1948. 31 pp., 6 figs. High recoveries of valuable hydrocarbons suitable for making gasoline, Diesel fuels, and fuel oils have been obtained from surface deposits of bituminous sandstones found near Edna, Calif. Describing a hot-water separation process tested on a laboratory scale by Bureau engineers, report includes distillation analyses of the bitumen cracked at different temperatures, data on the reduction of bitumen to coke by cracking, and the properties of asphalts from the Edna bituminous sandstones.
- †RI 4247. Bamford Zinc Mine, Lancaster County, Pa., by McHenry Mosier. 1948. 3 pp., 2 figs. In 1947 Bureau explored the Bamford zinc mine by diamond-drilling four holes, totaling 1,046 feet.
- RI 4248. National Motor-Gasoline Survey, Summer 1947, by O. C. Blade. 1948. 31 pp., 3 figs. Results of semiannual survey of motor fuels, twenty-second in a series, are compiled in this report. Analytical data for 2,332 samples, representing the products of approximately 125 companies, are included. Survey was made in cooperation with Coordinating Fuel Research Committee of Coordinating Research Council.
- RI 4249. Concentratibility of Birmingham, Ala., Red Iron Ores by Separation in Heavy Media, by B. H. Clemmons, R. H. Stacy, and B. G. Saunders. 1948. 45 pp., 2 figs. Summarizes results of a preliminary study undertaken to ascertain the response of iron ore from various sections of the Birmingham area to heavy-medium concentration. Work done in cooperation with University of Alabama.
- †RI 4250. Secondary Recovery of Oil by Water Flooding in Fields of North Texas, Supplement to R. I. 3906, History of Water Flooding of Oil Sands, in North Texas, by Robert K. Guthrie, James W. Amyx, and D. B. Taliaferro. 1948. 158 pp., 49 figs. Relates progress of secondary recovery of oil by water flooding in 55 fields in North Texas area. Water-injection projects, methods of completing and operating the wells, and source and treatment of the injection water are described, and operations and production histories since water-flooding methods were applied are summarized. Work done in cooperation with North Texas Oil and Gas Association. Supplements R. I. 3906, which described water flooding of oil sands in North Texas from 1936 to 1944.
- RI 4251. Investigation of Arkansas Bauxite. Volume I, by M. C. Malamphy, G. K. Dale, T. M. Romslo, A. H. Reed, Jr., A. Ollar, and J. I. Tracey, Jr. 1948. 63 pp., 31 figs. First of 13 volumes describing the Government's \$2,250,000 wartime investigation of Arkansas bauxite—the principal ore of aluminum. Summarizes entire bauxite project in Pulaski and Saline Counties, Ark., including information on history and development of the Arkansas bauxite-mining industry, which before the war produced 95 percent of all bauxite mined in this country.

Reports of Investigations

- RI 4252. Investigation of Arkansas Bauxite. Volume II. Deposits in N $\frac{1}{2}$ , T. 1 N., R. 11 W., by M. C. Malamphy, G. K. Dale, T. M. Romslo, A. H. Reed, Jr., and A. Ollar. 1948. 16 pp., 3 figs. Second in a series on bauxite project in Pulaski and Saline Counties, Ark., this report contains drill-hole information on the Bruton and Bruton Extension deposits.
- RI 4253. Investigation of Arkansas Bauxite. Volume III. Deposits in T. 1 N., R. 11 W., by M. C. Malamphy, G. K. Dale, T. M. Romslo, A. H. Reed, Jr., and A. Ollar. 1948. 84 pp., 7 figs. Third in a series on bauxite project in Pulaski and Saline Counties, Ark., this report gives drill-hole information on the Zuber, Dixie Extension, North Dixie, Ratcliffe, and Sweet Home deposits in the south half of T. 1 N., R. 11 W.
- RI 4254. Investigations of Arkansas Bauxite. Volume IV. Deposits in S $\frac{1}{2}$ , T. 1 N., R. 12 W., by M. C. Malamphy, G. K. Dale, T. M. Romslo, A. H. Reed, Jr., and A. Ollar. 1948. 135 pp., 7 figs. Fourth in a series on the bauxite project in Pulaski and Saline Counties, Ark., this report gives drill-hole information on the Fuller School, McClain, Cheatham, McClain-Burks-Nelson, Dixon, and Dixon clay deposits.
- RI 4255. Investigation of Arkansas Bauxite. Volume V. Deposits in N $\frac{1}{2}$ , T. 1 S., R. 12 W., by M. C. Malamphy, G. K. Dale, T. M. Romslo, A. H. Reed, Jr., and A. Ollar. 1948. 142 pp., 11 figs. Fifth in a series on the bauxite project in Pulaski and Saline Counties, Ark., this report gives drill-hole information on the Olaf Nelson, Vinson-Raines, Coe, Birnbach, Finnegan, Rauch Clay Extension, Glidewell, Price, Hempstead, and Dreher-Junkin-Herrod deposits.
- RI 4256. Investigation of Arkansas Bauxite. Volume VI. Deposits in N $\frac{1}{2}$ , T. 1 S., R. 12 W. (Continued), by M. C. Malamphy, G. K. Dale, T. M. Romslo, A. H. Reed, Jr., and A. Ollar. 1948. 118 pp., 12 figs. Sixth in a series on the bauxite project in Pulaski and Saline Counties, Ark., this report presents drill-hole data on additional deposits in N $\frac{1}{2}$ , T. 1 S., R. 12 W. They are the Rauch Clay, Dan Rauch, Peter Rou, Treadway, McGuire, Vinson, Dreher, Sipes, North Ironton, South Ironton, and Brown deposits.
- RI 4257. Investigation of Arkansas Bauxite. Volume VII. Deposits in N $\frac{1}{2}$ , T. 1 S., R. 12 W. (Continued), by M. C. Malamphy, G. K. Dale, T. M. Romslo, A. H. Reed, Jr., and A. Ollar. 1948. 131 pp., 11 figs. Seventh in a series on the bauxite project in Pulaski and Saline Counties, Ark., this report covers drilling on the remaining deposits in N $\frac{1}{2}$ , T. 1 S., R. 12 W. They are the Maughan, North Heckler, South Heckler, Jennings, C. Harrison, Hubbard, Kramer, E. A. Dixon, Bates, and the Kramer Extension deposits.
- RI 4258. Investigation of Arkansas Bauxite. Volume VIII. Deposits in S $\frac{1}{2}$ , T. 1 S., R. 12 W., by M. C. Malamphy, G. K. Dale, T. M. Romslo, A. H. Reed, Jr., and A. Ollar. 1948. 105 pp., 5 figs. Eighth in a series on the bauxite project in Pulaski and Saline Counties, Ark., this report gives drill-hole information on the Nutt-Bailey, Newman-Kendrick, and Smith deposits.
- RI 4259. Investigation of Arkansas Bauxite. Volume IX. Deposits in S $\frac{1}{2}$ , T. 1 S., R. 12 W. (Continued), by M. C. Malamphy, G. K. Dale, T. M. Romslo, A. H. Reed, Jr., and A. Ollar. 1948. 95 pp., 5 figs. Ninth in a series on the bauxite project in Pulaski and Saline Counties, Ark., this report covers drilling on the remaining deposits in S $\frac{1}{2}$ , T. 1 S., R. 12 W. They are the Cole, Hollenber, Rummel, and Alford-Ross.
- RI 4260. Investigation of Arkansas Bauxite. Volume X. Deposits in T. 1 S., R. 13 W., by M. C. Malamphy, G. K. Dale, T. M. Romslo, A. H. Reed, Jr., and A. Ollar. 1948. 32 pp., 4 figs. Tenth in a series on the bauxite project in Pulaski and Saline Counties, Ark., this report covers drilling on the Mayer and Lasater-McMurry deposits.
- RI 4261. Investigation of Arkansas Bauxite. Volume XI. Deposits in N $\frac{1}{2}$ , T. 2 S., R. 13 W., by M. C. Malamphy, G. K. Dale, T. M. Romslo, A. H. Reed, Jr., and A. Ollar. 1948. 139 pp., 5 figs. Eleventh in a series on the bauxite project in Pulaski and Saline Counties, Ark., this report covers drilling on the Little, Hurricane Creek, Tindall, and Bailey deposits.
- RI 4262. Investigation of Arkansas Bauxite. Volume XII. Deposits in S $\frac{1}{2}$ , T. 2 S., R. 13 W., Saline County, by M. C. Malamphy, G. K. Dale, T. M. Romslo, A. H. Reed, Jr., and A. Ollar. 1948. 149 pp., 3 figs. Twelfth in a series on the bauxite project in Pulaski and Saline Counties, Ark., this report covers drilling on the McNeil and East Bauxite deposits in Saline County.
- RI 4263. Investigation of Arkansas Bauxite. Volume XIII. Deposits in S $\frac{1}{2}$ , T. 1 S., R. 14 W., by M. C. Malamphy, G. K. Dale, T. M. Romslo, A. H. Reed, Jr., and A. Ollar. 1948. 99 pp., 3 figs. Thirteenth in a series on the bauxite project in Pulaski and Saline Counties, Ark., this report gives drill-hole information on the Harris and South Harris deposits.
- RI 4264. Investigation of Arkansas Bauxite. Volume XIV. Deposits in S $\frac{1}{2}$ , T. 1 S., R. 14 W. (Continued), by M. C. Malamphy, G. K. Dale, T. M. Romslo, A. H. Reed, Jr., and A. Ollar. 1948. 143 pp., 2 figs. Fourteenth in a series on the bauxite project in Pulaski and Saline Counties, Ark., this report presents drill-hole information on the Thomas-Williams deposit.
- RI 4265. Investigation of Arkansas Bauxite. Volume XV. Deposits in S $\frac{1}{2}$ , T. 1 S., R. 14 W. (Continued), by M. C. Malamphy, G. K. Dale, T. M. Romslo, A. H. Reed, Jr., and A. Ollar. 1948. 92 pp., 3 figs. Fifteenth in a series on the bauxite project in Pulaski and Saline Counties, Ark., this report covers drilling on the remaining deposits in S $\frac{1}{2}$ , T. 1 S., R. 14 W. They are the Bray-Thomas and Hardy deposits.
- RI 4266. Investigation of Arkansas Bauxite. Volume XVI. Deposits in N $\frac{1}{2}$ , T. 2 S., R. 14 W., by M. C. Malamphy, G. K. Dale, T. M. Romslo, A. H. Reed, Jr., and A. Ollar. 1948. 120 pp., 9 figs. Sixteenth in a series on the bauxite project in Pulaski and Saline Counties, Ark., this report gives drill-hole information on the Fletcher, Mildred McMurry, Archer, Walden, Walden Extension, Rock Island, Pine Haven Clay, and Pine Haven deposits.
- RI 4267. Investigation of Arkansas Bauxite. Volume XVII. Deposits in N $\frac{1}{2}$ , T. 3 S., R. 14 W., and S $\frac{1}{2}$ , T. 2 S., R. 14 W., by M. C. Malamphy, G. K. Dale, T. M. Romslo, A. H. Reed, Jr., and A. Ollar. 1948. 53 pp., 4 figs. Seventeenth in a series on the bauxite project in Pulaski and Saline Counties, Ark., this report presents drill-hole information on the Hudspeth & Fletcher and East Cargill deposits.
- RI 4268. Investigation of Arkansas Bauxite. Volume XVIII. Deposits in S $\frac{1}{2}$ , T. 2 S., R. 14 W. (Continued), by M. C. Malamphy, G. K. Dale, T. M. Romslo, A. H. Reed, Jr., and A. Ollar. 1948. 121 pp., 4 figs. Eighteenth and final report in a series on the bauxite project in Pulaski and Saline Counties, Ark., this report covers drilling on the remaining deposits in S $\frac{1}{2}$ , T. 2 S., R. 14 W. They are the West Cargill, Sutton, and International Paper.
- †RI 4269. Mining Program, Bureau of Mines Oil-Shale Project, Rifle, Colo., by E. D. Gardner. 1948. 19 pp., 10 figs. Describes experimental mining of oil shale at two underground mines near Rifle, Colo., and covers early development and construction phases of the work completed in 1947.
- RI 4270. Critical Review of Chemistry of Oxo Synthesis for Production of Alcohols from Olefins, Carbon Monoxide, and Hydrogen, with Discussion of Reaction Mechanism for Oxo and Related Syntheses, by Irving Wender and Milton Orchin. 1948. 26 pp., 1 fig. Presents a review and discussion of the chemistry of the addition of carbon monoxide and hydrogen to unsaturated carbon compounds to form the corresponding aldehydes.
- †RI 4271. Manufacture of Sponge Iron in Ceramic Tunnel Kilns, by V. H. Gottschalk, E. S. Beebe, and Richard



- S. Cole. 1948. 25 pp., 6 figs. High-grade sponge iron—a usable substitute for scrap iron in steel manufacture—can be produced in large tunnel kilns similar to those used in modern ceramic plants for making refractory ware. At a commercial plant in Salisbury, N. C., tests were made in a 29-car tunnel kiln, 200 feet long, 56 inches wide, and 60 inches high, fired with fuel oil and coal. Details of the operation of the 200-foot tunnel kiln and a small experimental tunnel kiln, as well as a discussion of types of “saggers” or containers, are included.
- RI 4272. Shasta and California Iron-Ore Deposits, Shasta County, Calif., by John R. Shattuck and Spangler Ricker. 1948. 11 pp., 3 figs. Bureau investigated the Shasta and California iron-ore deposits by topographical surveying and diamond drilling between March and September 1944. Five holes, totaling 2,910 feet, were drilled. Topographic and assay maps and detailed logs of the drilling operations are included.
- RI 4273. Survey of Commercial Aviation-Gasoline Characteristics, March 1947 Production, by W. C. Holliman, M. G. Barker, and Nancy Potts. 1948. 16 pp., 7 figs. First in a series of semiannual surveys of domestic aviation gasolines, prepared in cooperation with Coordinating Fuel and Equipment Research Committee of Coordinating Research Council, Inc., contains analyses of 71 samples of four grades of aviation fuels submitted by 15 manufacturers. Whereas previous surveys were conducted on a limited basis in connection with vapor-lock problems, the current surveys are expanded to include other information of general interest to aviation-gasoline manufacturers, aircraft-engine builders, airplane manufacturers, and airline operators. (See also RI 4353, 4424, and 4435.)
- RI 4274. Cranberry Magnetite Deposits, Avery County, N. C., and Carter County, Tenn., by M. H. Kline and T. J. Ballard. 1948. 85 pp., 34 figs. The Cranberry magnetite deposits occur in a belt 26 miles long, extending from 3 miles southeast of Cranberry, N. C., to about 6 miles southwest of Magnetic City, Tenn. Bureau of Mines investigation was confined to eastern part of belt, comprising area from Fork Mountain, Avery County, N. C., to the Heupscep Knob prospects in Carter County, Tenn. Approximately 10 miles of eastern part of belt were surveyed by geophysical methods, a number of magnetic anomalies were diamond-drilled, and a pilot plant was constructed for milling tests.
- RI 4275. Artillery Peak Manganese Deposits, Mohave County, Ariz., by Robert S. Sanford and Lincoln A. Stewart. 1948. 45 pp., 12 figs. Trenching, diamond drilling, and some experimental mining were done, and beneficiation tests were conducted at Bureau's Salt Lake City testing laboratory.
- RI 4276. Investigation of Meta-Anthracite in Newport and Providence Counties, R. I.; Petrography, Chemical Characteristics, and Geology of Deposits, by Albert L. Toenges, Louis A. Turnbull, Arthur Neale, J. M. Schopf, R. F. Abernethy, and Alonzo W. Quinn. 1948. 37 pp., 24 figs. Describes an investigation of the meta-anthracite deposits in Newport and Providence Counties, R. I. Gives logs of drilling operations, analyses of mine samples, and photomicrographs of rock specimens collected during the investigation.
- RI 4277. Investigation of the Hornsilver Lead-Zinc Property, Butte County, Idaho, by Robert N. Roby. 1948. 15 pp., 13 figs. Drilling, consisting of six diamond-drill holes, and trenching were done on the Hornsilver lead-zinc property. Assay plans of surface working, tabulations of assay results, results of concentration tests, and drill-hole logs are included.
- RI 4278. Dielectric Constant in Air-Ambient Electrostatic Separation, by Foster Fraas and Oliver C. Ralston. 1948. 12 pp., 1 fig. A study of the manner in which the dielectric constant of a solid material will affect its behavior in the electric field of a simple electrostatic concentrating mechanism.
- RI 4279. Concentration of Copper-Cobalt Ores from the Blackbird District, Lemhi County, Idaho, by R. R. Wells, W. G. Sandell, H. D. Snedden, and T. F. Mitchell. 1948. 21 pp., 4 figs. Describes a series of ore-dressing experiments conducted by Bureau on three lots of copper-cobalt ores from Blackbird district.
- RI 4280. Investigation of Ore-Dressing Methods for Barite Ores from New Mexico, Missouri, and Arkansas, by M. M. Fine and J. S. Kennedy. 1948. 31 pp. Gives results of an ore-dressing investigation of barite ores from five properties in New Mexico, Missouri, and Arkansas.
- RI 4281. Bauxite Deposits in Tippah and Benton Counties, Miss., by Donald F. Reed. 1948. 15 pp., 9 figs. Five areas—Finger, Shelton, Shady Grove, Blue Mountain, and Flat Rock Church—in Tippah and Benton Counties, Miss., were investigated in 1943 by drilling.
- †RI 4282. Determination of Sulfur Dioxide in Air by Means of the Midget Impinger, by S. J. Pearce and H. H. Schrenk. 1948. 6 pp. Describes a rapid and convenient method for determining hygienically significant concentrations of sulfur dioxide in air based on time required to decolorize an iodine-potassium iodide-starch solution in flask of a conventional midget impinger.
- RI 4283. Laboratory Concentration of Complex Sulfide-Oxide Ore from Shenandoah-Dives Mine, Silverton, Colo., by Heine Kenworthy. 1948. 16 pp. Describes laboratory methods used successfully by Bureau to increase yield of lead from complex sulfide-oxide ore from Shenandoah-Dives mine. Gives individual and composite results of the classification and table concentration of ore, with treatments of table middling, slime table tailing, and table tailing.
- RI 4284. Ellington Manganese Deposit, Reynolds County, Mo., by A. C. Johnson. 1948. 5 pp., 2 figs. Late in 1941 Bureau of Mines cleaned, deepened, and sampled many of the existing pits and dug and sampled 27 new ones.
- RI 4285. Measurement of Coking Pressure in a Small Laboratory Oven, by B. W. Naugle, J. D. Davis, J. T. McCartney, and J. E. Wilson. 1948. 15 pp., 9 figs. Describes Bureau of Mines experiments in a small-scale laboratory coke oven to determine value of such a small oven in predicting the coking pressures to be expected in commercial coke oven. Includes details of design and operation of small vertical oven constructed by Bureau, data on duplicate results, comparison of results in large vertical ovens, and probable reasons for disparity between small-scale and industrial ovens.
- RI 4286. New Dry Concentrating Equipment, by W. J. Long. 1948. 10 pp., 7 figs. Describes three dry-ore concentrators developed to separate minerals of different shape, magnetic susceptibility, or electrostatic conductivity. They are the vibrating-deck mineral shape separator, electrostatic mineral shape separator, and progressing-field magnetic separator.
- †RI 4287. Performance of a Diesel Mine Locomotive, by L. B. Berger and R. T. Artz. 1948. 15 pp., 9 figs. Presents a résumé of the general performance characteristics of Diesel engines and results of tests of a Diesel-powered locomotive used for underground haulage in a clay mine made to determine composition of exhaust gases produced by engine under actual haulage conditions and to determine effects of operation on quality of mine atmosphere.
- RI 4288. Flood-Prevention Projects at Pennsylvania Anthracite Mines. Progress Report for Fiscal Year Ended June 30, 1947, by S. H. Ash, W. E. Cassap, W. L. Eaton, Karl Hughes, W. M. Romischer, and James Westfield. 1948. 51 pp., 28 figs. Describes flood-prevention projects conducted by Bureau in Pennsylvania anthracite region. Discusses anthracite reserves, underground water pools, barrier pillars, the “buried valley” of the Susquehanna River, and infiltration of surface water into underground workings.

†Out of print.

Reports of Investigations

- RI 4289. Analyses of Crude Oils from 283 Important Oil Fields in the United States, by C. M. McKinney and O. C. Blade. 1948. 154 pp. This report, one of the most comprehensive reports ever published on analyses of American crude oils, lists analyses on crude oils from 283 of the Nation's approximately 340 major petroleum fields producing 2,500 barrels or more daily.
- RI 4290. Conrad Hill Copper and Gold Deposit, Davidson County, N. C., by T. J. Ballard and Austin B. Clayton. 1948. 7 pp., 10 figs. Bureau of Mines mapped and sampled accessible mine workings.
- RI 4291. Concentration of Miscellaneous Oxide Manganese Ores from Yavapai, Yuma, Maricopa, and Mohave Counties, Ariz., by W. J. Long, J. V. Batty, and K. C. Dean. 1948. 24 pp. Describes metallurgical tests used to obtain a fair recovery of manganese from low-grade Arizona oxide manganese ores. Tests were conducted on ore samples from Burmeister mine, Yavapai County; Spring manganese mine, Yuma County; Black Vulture mine, Maricopa County; and Black Warrior mine, Mohave County.
- RI 4292. Investigation of the Krueger Zinc Deposit, Washington County, Mo., by Homer J. Ballinger. 1948. 49 pp., 2 figs. Bureau drilled 5 churn-drill holes on the Krueger property between December 1943 and February 1944 and completed 19 diamond-drill holes from December 1946 to April 1947.
- RI 4293. Christmas Copper Deposit, Gila County, Ariz., by Stanton L. Tainter. 1948. 58 pp., 18 figs. Diamond drilling was done by Bureau of Mines at various levels of the Christmas mine in Gila County, Ariz. Maps, diagrams, and logs of the drill holes are included.
- RI 4294. Applicability of Radio to Emergency Mine Communications. Progress Report, September 1946 to November 1947, by E. W. Felegy and E. J. Coggeshall. 1948. 56 pp., 18 figs. Experiments on radio communication in mines, between the surface and underground workings, were made in Bureau's Experimental mine at Bruceston, Pa., in two commercial bituminous mines, three anthracite collieries, a salt mine, and an iron mine. Test and calibration procedure followed are described, details of investigations at each of the mines visited are presented, and tests on radio communication in United States mines with similar tests in gold mines on the Witwatersrand, South Africa, are compared. Bibliography included.
- RI 4295. A Method of Evaluating Bleaching Clays, by Donald W. Ross. 1948. 26 pp. Describes development of a method of comparing clays proposed for use in clarifying or decolorizing petroleum oils, and discusses color measurement, desiccating agents and moisture control, decolorization at elevated temperatures, oil testing, and the activation and dehydration of oil-decolorizing clays.
- RI 4296. Laboratory Methods for Evaluating Materials for Mineral-Wool Production, by S. M. Molloy and W. A. Calhoun. 1948. 11 pp., 8 figs. Describes laboratory testing methods used in evaluating the physical properties of a mineral wool.
- RI 4297. Mon-Ark Zinc-Lead Mines, Christian County, Mo., by Homer J. Ballinger. 1948. 16 pp., 7 figs. Between September 1943 and January 1944 the Bureau churn-drilled 29 holes, totaling 6,493 feet, on this property.
- RI 4298. Blue Metal Corundum-Andalusite Deposit, Douglas County, Nev. Supplemental Investigation by E. O. Binyon. 1948. 1 p., 2 figs. The Blue Metal corundum-andalusite deposit in the Buckskin Mining District, Douglas County, Nev., was explored by Bureau in 1945, and results of that work were presented in RI 3895. Further exploration carried on in April and May 1947, results of which are presented in this report. Work consisted of 175 feet of drift and cross-cut, bringing the total to 398 feet of underground working.
- †RI 4299. Extraction of Alumina from High-Iron Bauxites, Pilot-Plant Tests Employing the Lime-Soda Sinter Process, by Frank J. Cservenyak, John Rupert, and David E. Garen. 1948. 29 pp., 5 figs. This report, the fourth in a series of five describing the use of the lime-soda sinter process on low-grade domestic ores, describes metallurgical tests used to obtain an excellent recovery of alumina from high-iron Arkansas bauxite. (See also B 465 and RI 4069 and 4132.)
- RI 4300. Effect of Acid Oxides Upon Desulfurization in the Iron-Manganese System, by M. B. Royer and A. J. Williams, Jr. 1948. 25 pp., 3 figs. Gives results of tests conducted to determine whether there was slag dispersion throughout a manganese melt and whether such slag dispersion, if present, was a prominent factor in the rapid desulfurization effect obtained with slags that are initially acid in composition.
- RI 4301. Ore-Dressing Investigation of Oxidized Lead Ores from Missouri and Illinois, by M. M. Fine. 1948. 10 pp. Gives results of tests on four samples of oxidized lead ore, one from Magajupa Mining Co., Jasper County, Mo., and three from Alco Lead Co., Golconda, Ill.
- RI 4302. Concentration of Manganese Ores from Boulder Dam Recreational Area, Clark County, Nev., by J. V. Batty and W. W. Agey. 1948. 12 pp. Ores from the Virgin River and Boulder City manganese deposits were subjected to various metallurgical treatments. These included tabling, flotation, differential crushing, and magnetic separation tests.
- RI 4303. Electrolytic Manganese in Open-Hearth and Bessemer Steel Tests at Jones & Laughlin Steel Corp., Pittsburgh, Pa., by Frederick Sillers, Jr. 1948. 33 pp. Relating work of the steel industry in utilizing electrolytic manganese produced under a process developed by Bureau of Mines metallurgists, describes results of two series of cooperative industrial tests designed to establish value of electrolytic manganese in steel making. Both series of tests were conducted in cooperation with Jones & Laughlin Steel Corp., of Pittsburgh, Pa., the first in 1940 and the second in 1946.
- RI 4304. Determination of Moisture in Coal with the Brabender Semiautomatic Tester, by H. M. Cooper, E. C. Tarpley, and R. F. Abernethy. 1948. 15 pp., 2 figs. Describes tests of a semiautomatic tester manufactured by the Brabender Corp. and designed to make reasonably accurate and rapid determinations of the moisture content of coal. Included are comparisons of Brabender and A. S. T. M. moisture values on samples of 60- and 20-mesh coal of various ranks and comparative drying rates by both methods.
- RI 4305. Production of Sponge Iron: Gaseous Reduction of Iron Oxide Glomerules in a Shaft Furnace, by Edward P. Barrett and Carl E. Wood. 1948. 19 pp., 6 figs. Describes successful reduction of iron ores to sponge iron in a continuously operated alloy-steel shaft furnace, using hydrogen or water gas as the reducing agent. Includes construction details of equipment and test data.
- RI 4306. A Combination Cleaning and Dewatering Process for Treating Fine Sizes of Coal. Preliminary Report, by E. W. Gandrud and H. L. Riley. 1948. 25 pp., 9 figs. Describes progress in developing a method that may prove economically practical for cleaning and dewatering fine-sized coal in one continuous operation.
- RI 4307. Churn Drilling at the McIlhonn Zinc Deposit, Iowa County, Wis., by Owen W. Terry. 1948. 8 pp., 2 figs. In 1943 Bureau conducted an investigation and program of churn drilling on the McIlhonn and adjoining Pearson land in the Mineral Point district of Iowa County, Wis. Sixteen holes, aggregating 1,570 feet, were completed.
- RI 4308. Churn Drilling at the McGregor Zinc-Lead Mine, Washington County, Mo., by W. D. McMillan. 1948. 6 pp., 3 figs. In 1943 Bureau of Mines drilled

†Out of print.

- four churn-drill holes, totaling 435 feet, at the Mc-Gregor zinc-lead mine.
- RI 4309. Investigation of Track Rock Corundum Mine, Union County, Ga., by T. J. Ballard. 1948. 5 pp., 1 fig. In 1943 Bureau investigated the Track Rock corundum mine by excavating 562 feet of trenches, totaling 228 cubic yards, and opening 125 feet of caved tunnel.
- RI 4310. Investigation of Rickard Corundum Mine, York County, S. C., by T. J. Ballard. 1948. 6 pp., 2 figs. From October 1943 to February 1944 Bureau explored the Rickard corundum mine. Seven hundred and fifty-four linear feet of trenches were dug, 110 feet of old drifts at the south shaft were cleaned out, and 80 feet retimbered for examination.
- RI 4311. Investigation of Louise Chromite Deposits, Troup County, Ga., by T. J. Ballard, 1948. 24 pp., 5 figs. Chromite deposits near Louise, Troup County, Ga., were studied from September 1, 1943, to March 15, 1943. Test pits and a shaft were sunk, drifts and crosscuts were driven, and hand-auger drilling was done.
- RI 4312. Investigation of Simon & Coles Manganese Deposit, Bedford County, Pa., by W. H. Kerns and Robert S. Sanford. 1948. 6 pp., 2 figs. Two churn-drill holes were bored and eight channel samples were taken at the Simon & Coles manganese deposit in Sherman Valley, Bedford County, Pa., in 1942. Analyses of samples are included.
- RI 4313. Churn Drilling at Mary Arnold Zinc-Lead Mines, Christian County, Mo., by Homer J. Ballinger. 1948. 8 pp., 3 figs. In the winter of 1943-44 Bureau engineers completed five churn-drill holes, aggregating 1,043 feet, in Christian County.
- RI 4314. Investigation of Southeast Missouri Secondary Limonite Deposits, Wayne, Butler, and Ripley Counties, Mo., by Homer J. Ballinger and Paul Pesonen. 1948. 46 pp., 15 figs. In 1943 and 1944 Bureau of Mines investigated nine secondary limonite iron-ore deposits in Wayne, Butler, and Ripley Counties, Mo., by rotary-bucket and power-auger drilling, test pitting, and trenching.
- RI 4315. Investigation of the Dubois Fluorite Property, Hardin County, Ill., by Arthur S. Swanson. 1948. 7 pp., 2 figs. In 1944 Bureau bored four core-drill holes, totaling 1,106 feet, on this property. Location map, detailed map of property, and logs of drill holes are included.
- RI 4316. Diamond Drilling at the Tallapoosa Copper Mine, Haralson County, Ga., by T. J. Ballard and F. K. McIntosh. 1948. 8 pp., 6 figs. Four holes, totaling 1,570.3 feet, were diamond-drilled by Bureau at Tallapoosa mine in 1947. Maps, diagrams, and tables showing analyses of the samples obtained are included.
- RI 4317. Investigation of the Crescent Lead and Zinc Mine, Iowa County, Wis., by M. Howard Berliner. 1948. 6 pp., 1 fig. During May, June, and July 1944 Bureau completed 24 churn-drill holes, aggregating 1,290 feet of drilling, on this property.
- RI 4318. Churn Drilling at the Capital and Greenland Zinc Mines, Lawrence County, Mo., by Louis C. Brichta and A. B. Needham, 1948. 24 pp., 4 figs. Bureau investigated Capital mine in 1943 and 1944 by drilling 19 churn-drill holes and Greenland mine in 1944 by 2 churn-drill holes. Maps, drill-hole logs, and analyses of the samples are included.
- †RI 4319. Petroleum-Engineering Study of the Lake Creek Field, Montgomery County, Tex., by H. B. Hill and Felix A. Vogel, Jr. 1948. 65 pp., 28 figs. Outlines history and geology of the field, discusses reservoir data, and includes estimates of initial volume of gas and recoverable condensate per acre-foot for each zone, as well as an estimate of recoverable oil.
- RI 4320. Investigation of the Skene Zinc Mine, Jo Daviess County, Ill., by O. W. Terry and Francis C. Lincoln. 1948. 5 pp., 3 figs. In 1944 Bureau drilled five churn-drill holes, aggregating 1,121 feet.
- RI 4321. Recovery of Lithium from Its Various Ores and Salts, by J. B. Cunningham and C. H. Gorski. 1948. 35 pp., 3 figs. Describes tests in which lithium was recovered successfully from amblygonite (an ore of which there are sizable deposits in the Black Hills of South Dakota), from lithium phosphate, and from dilithium-sodium phosphate. Process developed for amblygonite also was employed for recovering lithium from spodumene, the most commonly used ore. Describes methods, materials, and equipment used. Includes tables and flow charts.
- RI 4322. Investigation of the Morelock Creek Tin Placer Deposits, Fort Gibbon District, Alaska, by Bruce I. Thomas and W. S. Wright. 1948. 8 pp., 5 figs. In 1943 Bureau investigated Morelock Creek deposits by churn drilling, test pitting, shaft sinking, and open-cut mining. Logs of drilling operations are given.
- RI 4323. Investigation of the Tozlmoran Creek Tin Placer Deposits, Fort Gibbon District, Alaska, by Bruce I. Thomas and W. S. Wright. 1948. 11 pp., 4 figs. To determine tin-ore content of stream gravels along Tozlmoran Creek, Bureau investigated area by excavating nine trenches and two shafts in September 1944. Results of ore analyses included.
- RI 4324. Core Drilling at the Victory Fluorspar Mine, Hardin County, Ill., by O. M. Bishop and A. S. Swanson. 1948. 8 pp., 2 figs. In 1943 and 1944 Bureau drilled 21 vertical holes, totaling 1,837.5 feet, at the Victory fluorspar mine. Location map, mine map showing location of holes drilled, and drill-hole logs are included.
- RI 4325. Investigation of Rex Zinc Mine, Howell County, Mo., by Homer J. Ballinger. 1948. 11 pp., 2 figs. Bureau investigated Rex property by drilling four churn-drill holes, totaling 880.5 feet, in 1947. Drill-hole logs and analyses of samples are given.
- RI 4326. Investigation of the Critchfield Manganese Deposit, Huntingdon County, Pa., by W. H. Kerns and Robert S. Sanford. 1948. 7 pp., 2 figs. In October 1942 Bureau investigated the Critchfield manganese deposit. Six rotary bucket-drill holes and three hand-auger holes, aggregating 370 feet, were completed. Logs of holes and analyses of drill-hole samples are given.
- RI 4327. Investigation at the Fairplay Zinc and Lead Area, Grant County, Wis., by James V. Kelly. 1948. 5 pp., 1 fig. In 1946 and 1947 Bureau completed 15 diamond-drill holes, totaling 2,457.6 feet, on this property.
- RI 4328. Investigation of the Ore Hill Zinc-Lead Mine, Grafton County, N. H., by H. P. Hermance and McHenry Mosler. 1948. 13 pp., 10 figs. Fourteen holes, totaling 4,899 feet, were diamond-drilled on this property in 1943 and 1944. Maps and drill-hole information included.
- RI 4329. Investigation of Kiowa County Clays, Kiowa County, Okla., by C. C. Knox. 1948. 17 pp., 2 figs. In 1943 and 1944 Bureau investigated Kiowa County clay deposits by drilling 45 holes, totaling 1,723 feet. Logs of drill holes included.
- RI 4330. Concentration of Oxide Manganese Ores from the Aguila District, Arizona, by W. G. Sandell and D. T. Holmes. 1948. 10 pp. To determine possibilities of Aguila mining district as a source of commercial-grade manganese, Bureau subjected three lots of ore from Black Nugget, Black Queen, and Sambo Aguila properties to various metallurgical treatments. Descriptions of testing procedure employed are included.
- RI 4331. Concentration of Richmond Hill Oxide Manganese Ore from Lead, Lawrence County, S. Dak., by G. M. Potter and K. C. Dean. 1948. 8 pp. Describes ore-dressing tests conducted by Bureau on a sample of ore submitted by Richmond Hill Mining Co. of Lead, S. Dak.
- RI 4332. Investigation of the Dempsey Zinc-Lead Mine, Washington County, Mo., by W. D. McMillan, M. M. Fine, and H. Kenworthy. 1948. 16 pp., 5 figs. Bureau

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## Reports of Investigations

- investigated this property by drilling 20 churn-drill holes, totaling 1,309 feet. Churn-drill hole logs and analyses of samples included.
- RI 4333. Zinc Smelting in the Horizontal Retort Fired with Natural Gas. 1. Development of Firing Schedules, by G. L. Oldright. 1948. 71 pp., 1 fig. Outlines reasoning followed in trying to locate causes of zinc losses, explains why methods of temperature control were used to diagnose difficulties as well as to operate plant, and continues with development of firing schedules. Work done in cooperation with Eagle-Picher Mining & Smelting Co. (See also RI 4334-4336.)
- RI 4334. Zinc Smelting in the Horizontal Retort Fired with Natural Gas. 2. General Conditions of Combustion Influencing Temperatures, by G. L. Oldright. 1948. 41 pp., 3 figs. Discusses temperature and air-gas volume measurement, air: gas ratio, significance of temperatures measured—control points, and effect of gas pressures in firing chamber of furnace on regularity of temperatures and on control of firing. Work done in cooperation with Eagle-Picher Mining & Smelting Co. (See also RI 4333.)
- RI 4335. Zinc Smelting in the Horizontal Retort Fired with Natural Gas. 3. Nature of Retort Charge vs. rates of Spelter Production, by G. L. Oldright. 1948. 42 pp., 7 figs. Describes some changes in firing and distilling practices required in treating less desirable zinc-bearing materials. Work done in cooperation with Eagle-Picher Mining & Smelting Co. (See also RI 4333.)
- RI 4336. Zinc Smelting in the Horizontal Retort Fired with Natural Gas. 4. Burner Design, by G. L. Oldright. 1948. 111 pp., 11 figs. Discloses methods and design principles for various burners, with examples from experimental and commercial furnaces showing interrelation of such dimensions with combustion and temperature in furnace. Work done in cooperation with Eagle-Picher Mining & Smelting Co. (See also RI 4333.)
- RI 4337. Investigation of Melrose Zinc-Lead District, Ottawa County, Okla., and Cherokee County, Kans., by Clinton C. Knox. 1948. 92 pp., 22 figs. Estimated recoverable zinc- and lead-ore reserves in the Melrose district of northeastern Oklahoma and southeastern Kansas were increased by more than 380,000 tons through Bureau of Mines investigations in this district in 1944-46. Ninety churn-drill holes, totaling 33,808 feet, were completed, and a number of topographic and geophysical surveys were made.
- RI 4338. Magnetometric Survey of the Mahopac Magnetite Mine, Putnam County, N. Y., by W. T. Millar, Hugo E. Kuehn, Guy E. Dent, and Robert S. Sanford. 1948. 4 pp., 3 figs. In 1943 a magnetometric survey was conducted by Bureau at Mahopac magnetite mine in an endeavor to locate a segment of ore body that, reports state, was cut off by a fault. Describes work done on project and presents data obtained.
- RI 4339. Investigation of the Mateen Spodumene Deposit, Pennington County, S. Dak., by Staff of the Minneapolis Branch, Mining Division. 1948. 20 pp., 7 figs. The Mateen spodumene deposit was investigated in 1942 and 1944. Sixty-one channel samples were taken from surface trenches, four from a shaft, and three from the face of an open cut. Eight diamond core-drill holes were completed.
- RI 4340. Investigation of the Argall (Baggaley) Zinc-Lead Mine, Iowa County, Wis., by M. Howard Berliner. 1948. 5 pp., 2 figs. Bureau investigated Argall zinc-lead mine by churn drilling. Seven churn-drill holes were completed in August 1943. A location map and map showing location of drill sites are enclosed.
- RI 4341. Investigation of the Ore Knob Copper Mine, Ashe County, N. C., by T. J. Ballard and A. B. Clayton. 1948. 8 pp., 5 figs. From December 1942 to April 1943 Bureau diamond-drilled 20 holes, totaling 4,945 linear feet, on this property. Ninety drill-hole samples and 31 mine samples for assay were collected.
- RI 4342. Investigation of Round Mountain Manganese Properties, Bland County, Va., by M. H. Kline and A. F. Robertson. 1948. 9 pp., 8 figs. Describes results of an investigation of manganese deposits on Round Mountain, in Bland County, Va., carried on from January to August 1942.
- RI 4343. Investigation of the North Arkansas Zinc Mines, Searcy, Boone, and Newton Counties, Ark., by R. B. McElwaine, T. M. Romslo, and J. R. Thoenen. 1948. 25 pp., 7 figs. In 1943 and 1944 Bureau churn-drilled 18 holes, aggregating 2,571 feet, in investigating zinc deposits of north-central Arkansas district. Drill-hole logs included.
- RI 4344. Investigation of the Cape Rosier Zinc-Copper-Lead Mine, Hancock County, Maine, by S. B. Levin and Robert S. Sanford. 1948. 8 pp., 14 figs. In 1942 Bureau investigated the Cape Rosier mine. Nine diamond-drill holes, aggregating 2,883 feet, were completed.
- RI 4345. Churn Drilling at Cape Mountain Tin Placer Deposits, Seward Peninsula, Alaska, by Harold E. Heide and Robert S. Sanford. 1948. 14 pp., 7 figs. In 1943 Bureau churn-drilled 138 holes on the principal tin-bearing creeks of Cape Mountain placer-mining district, about 107 miles northwest of Nome.
- RI 4346. Sampling Methods and Results at the Sullivan Creek Tin Placer Deposits, Manley Hot Springs, Toftoy, Alaska, by Robert L. Thorne and W. S. Wright. 1948. 8 pp., 6 figs. Presents a detailed description of sampling methods and sample analyses of the Sullivan Creek tin placer deposits in central Alaska investigated by Bureau in 1943.
- RI 4347. Diamond Drilling at the Big Ore Bank Magnetite Deposits, Lincoln County, N. C., by Austin B. Clayton and W. Bruce Montgomery, Jr. 1948. 6 pp., 7 figs. Between November 1943 and April 1944 Bureau diamond-drilled 10 holes, totaling 4,493.5 feet. Five hundred and eight sludge samples and 119 core samples were collected for analysis. Topographic and assay maps of the Lincoln County magnetite deposits included.
- RI 4348. Barite Deposits in the Ouachita Mountains, Montgomery, Polk, and Pike Counties, Ark., by Thomas A. Jones. 1948. 15 pp., 8 figs. Describes results of an investigation of barite deposits in the Ouachita Mountains in Arkansas conducted by Bureau in 1946 and 1947. Ten barite deposits were examined, trenced, and sampled.
- RI 4349. Diamond Drilling at Rush & Brown Copper Mine, Kasaan Bay, Prince of Wales Island, Southeastern Alaska, by S. P. Holt, J. G. Shepard, R. L. Thorne, A. W. Tolonen, and E. L. Fosse. 1948. 7 pp., 5 figs. Bureau drilled four diamond-drill holes, ranging from 36 feet to 155 feet in length, on this property in August 1943.
- RI 4350. Investigation of the Blewett Zinc-Lead Deposit, Jo Daviess County, Ill., by Stephen P. Holt. 1948. 36 pp., 7 figs. In 1946 Bureau drilled eight churn-drill holes, totaling 1,706 feet, and nine diamond-drill holes, totaling 1,987.4 feet, at the Blewett zinc-lead deposits.
- RI 4351. A Process for the Production of Iron-Free Alum. Part 2. Pilot-Plant Development, by William K. Cunningham, Edwin A. Gee, and R. August Heindl. 1948. 60 pp., 33 figs. Describes pilot-plant research in the production of iron-free alum from low-grade bauxites and clays. (See also RI 4191.)
- RI 4352. West Portal Magnetite Mines, Hunterdon County, N. J., by G. B. Botsford and McHenry Mosier. 1948. 11 pp., 2 figs. In 1943 and 1944 Bureau investigated the West Portal magnetite mines, which comprise the Swayze and Turkey Hill properties, by conducting a magnetic survey of the properties, diamond-drilling 11 holes, totaling 4,910 feet, and collecting 142 samples for chemical analysis.

- RI 4353. Survey of Commercial Aviation Gasoline Characteristics, July 1947 Production, by W. C. Holliman, M. G. Barker, and Nancy Potts. 1948. 16 pp., 7 figs. This report, the second of a series on the characteristics of commercial aviation gasolines, presents inspection test data furnished on their products by 15 manufacturers of commercial grades of aviation gasoline and special data obtained in Bureau of Mines laboratories on samples of these gasolines. Work done in cooperation with the Coordinating Fuel and Equipment Research Committee of the Coordinating Research Council, Inc. (See also RI 4273, 4424, and 4435.)
- RI 4354. National Motor-Gasoline Survey, Winter 1947-48, by O. C. Blade. 1948. 31 pp., 2 figs. This survey, the first made in cooperation with American Petroleum Institute, includes service station gasolines of 140 major and minor companies and contains analytical data for 3,554 samples of gasolines from 17 marketing areas of the country. Twenty-two previous surveys since 1935 were made in cooperation with Coordinating Fuel Research Committee of Coordinating Research Council, Inc.
- RI 4355. Investigation of the Sauk Mountain Limestone Deposits, Skagit County, Wash., by Constantine C. Popoff. 1948. 14 pp., 4 figs. During 1946 Bureau made transit and topographic surveys of these limestone deposits and collected 21 samples for analysis.
- RI 4356. Investigation of Knik Valley Chromite Deposits, Palmer, Alaska, by Stuart Bjorklund and W. S. Wright. 1948. 5 pp., 9 figs. In 1942 Bureau further explored the Knik Valley chromite deposits by trench sampling and diamond drilling.
- RI 4357. Investigation of the Sutherland Copper Prospect, Floyd County, Va., by Wesley A. Grosh. 1948. 2 pp., 3 figs. During February and March 1943 Bureau investigated the Sutherland copper prospect. Fourteen holes, totaling 913 feet were diamond-drilled.
- RI 4358. Investigation of the Salt Chuck Mine, Kasaa Peninsula, Prince of Wales Island, Southeastern Alaska, by S. P. Holt, J. G. Shepard, R. L. Thorne, A. W. Tolonen, and E. L. Fosse. 1948. 16 pp., 13 figs. In July 1943 Bureau diamond-drilled 13 holes totaling 1,550 linear feet, on this Alaskan copper deposit, which produced 6,200,000 pounds of copper between 1905 and 1941. Included are logs of the drilling operations, sample analyses, and results of beneficiation tests.
- RI 4359. Investigation of the Minah Lead-Silver Mine, Jefferson County, Mont., by S. H. Lorain and R. J. Hundhausen. 1948. 9 pp., 5 figs. During 1946 and 1947 Bureau explored the Minah lead-silver mine by angledozer trenching and core drilling.
- RI 4360. Investigation of the W. E. Dunkle Coal Mine, Costello Creek, Chulitna district, Alaska, by F. A. Rutledge. 1948. 9 pp., 8 figs. The W. E. Dunkle mine, sometimes called the Costello Creek coal mine, was investigated in 1943 by the Bureau by trenching, diamond drilling, and sampling.
- RI 4361. Investigation of the Rainy Creek Mercury Prospect, Bethel District, Kuskokwim Region, Southwestern Alaska, by F. A. Rutledge. 1948. 7 pp., 5 figs. In August 1947 Bureau investigated the Rainy Creek mercury deposits by trenching. Nineteen samples were taken for analyses.
- RI 4362. Investigation of the Toncrae-Howard Copper Deposits, Floyd County, Va., by Wesley A. Grosh. 1948. 4 pp., 6 figs. In 1943 Bureau explored the Toncrae-Howard copper deposits. Twenty-nine holes, totaling 2,187 feet, were diamond-drilled, 325 drill-hole samples were collected, and 28 channel samples were cut.
- †RI 4363. Method for the Spectrochemical Determination of Beryllium, Cadmium, Zinc, and Indium in Ore Samples, by Graham W. Marks and Betsy M. Jones. 1948. 27 pp., 18 figs. Deals with analyses for beryllium, zinc, cadmium, and indium. Three basic problems in these investigations are to study influence of those elements that make up the greater part of an ore sample on the spectral-line intensities of the elements for which analyses are being made; to develop proper methods for preparation of standard spectrographic curves; and to improve in equipment and procedure, so that greater accuracy can be achieved.
- RI 4364. Diamond Drilling at Union Copper Mine, Cabarrus and Rowan Counties, N.C., by T. J. Ballard and Austin B. Clayton. 1948. 9 pp., 8 figs. In 1943 Bureau diamond-drilled 8 holes on this property, analyzed 205 core samples, and mapped the immediate mine area.
- RI 4365. Investigation of French Hill Chromite Mine, Del Norte County, Calif., by W. C. Sanborn and Spangler Ricker. 1948. 9 pp., 4 figs. In 1946 Bureau diamond-drilled 14 holes on this property. Includes detailed information on drilling and mining costs.
- RI 4366. Flake-Graphite and Vanadium Investigation in Clay, Coosa, and Chilton Counties, Ala., by Hugh D. Pallister and J. R. Thoenen. 1948. 84 pp., 35 figs. Eleven mining areas in Alabama, covering 49 graphite deposits, were mapped and studied in detail for graphite and vanadium by the Bureau. More than 9 miles of access trails were built, 17,930 feet of bulldozer trenches were completed, 5,234 feet of trenches were deepened or dug by hand, 3,279 feet of existing trenches were sampled, and 84 diamond-drill holes, aggregating 5,453 feet were completed.
- †RI 4367. Petroleum-Engineering Study of Sheridan Field, Colorado County, Tex., by H. B. Hill and Felix A. Vogel, Jr. 1949. 94 pp., 34 figs. This report, an engineering analysis of the reservoirs in Sheridan field, includes estimates of gas and hydrocarbon-liquid reserves, outlines history and geology of the field, tabulates well and production data, and describes methods and practices of development.
- RI 4368. Investigation of Chromite Deposits of the Stillwater Complex, Stillwater and Sweetgrass Counties, Mont., by N. L. Wimmier. 1948. 41 pp., 23 figs. Investigation of chromite deposits along the Stillwater complex in Stillwater and Sweetgrass Counties, Mont., was made between 1939 and 1943 as part of a general Bureau investigation of Montana chromite. Describes major operations in Stillwater and Sweetgrass Counties, and provides information on general geology and history of the area.
- RI 4369. Investigation of the Four Chromes and Other Chromite Deposits, Red Lodge District, Carbon County, Mont., by J. A. Herdlick. 1948. 13 pp., 3 figs. Describes principal chromite deposits in the Red Lodge area and discusses history and production and general geology of the area.
- RI 4370. Concentration of Fluorite from Tailings and Mine Waste Rock in Crittenden and Livingston Counties, Ky., by M. M. Fine. 1948. 21 pp. Gives results of laboratory investigations of samples from tailing piles and rock dumps from nine fluor spar properties in Crittenden and Livingston Counties.
- RI 4371. Shaped Charges Applied to Mining. Part 1. Drilling Holes for Blasting, by Hiram C. Draper, James E. Hill, and Wing G. Agnew. 1948. 12 pp., 17 figs. Gives results of tests undertaken by the Bureau, in cooperation with Obstacle and Demolition Branch, Engineer Research and Development Laboratories, Department of the Army, in the use of

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Reports of Investigations

- military demolition-type charges for drilling blastholes.
- RI 4372. Investigation of the Nigger Jim Lead Diggings, Lafayette County, Wis., by G. A. Apell. 1949. 9 pp., 2 figs. In 1947 and 1948 Bureau bored 30 churn-drill holes, totaling 1,808 feet, and 2 diamond-drill holes, totaling 164.5 feet, and sank 2 test pits, aggregating 25 feet in depth.
- RI 4373. Investigation of Tolstoi Mountain Iron Deposits, Kasaan Peninsula Prince of Wales Island, Southeastern Alaska, by Aner W. Erickson. 1948. 5 pp., 7 figs. In 1944 Bureau examined the Tolstoi Mountain iron deposits. Exploratory work consisted of contour mapping, dip-needle surveying, trenching, and channel sampling.
- †RI 4374. Application of Ion-Exchange Resins in the Cyanidation of a Gold and Silver Ore, by S. J. Hussey. 1949. 34 pp., 1 fig. Gives preliminary results of experiments conducted at Intermountain Experiment Station of Bureau of Mines, Salt Lake City, Utah, on use of ion-exchange resins to recover gold and silver from a clayey, slimy ore by cyanidation.
- RI 4375. Missouri Valley Manganese Deposits, South Dakota. Part I. General Investigations. Stratigraphic Studies, and Tonnage and Grade Estimates, by Paul E. Pesonen, Edward L. Tullis, and Paul Zinner. 1949. 90 pp., 20 figs. Gives results of an extensive investigation by Bureau between July 1945 and August 1947 to determine extent, grade, and character of manganese deposits on both flanks of Missouri River Valley and its major tributaries in South Dakota. Work done in cooperation with United States Department of the Interior agencies participating in the Missouri Basin Development Plan. (See also RI 4428 and 4429.)
- RI 4376. Laramie Sponge-Iron Pilot Plant, by T. L. Johnston and W. M. Mahan. 1948. 44 pp., 19 figs. Deals with a series of 40 tests conducted at Bureau's sponge-iron pilot plant at Laramie, Wyo., in 1944 and 1945, for producing sponge iron.
- RI 4377. A Method for Spectrochemical Determination of Silver in Ore Samples, by Graham W. Marks and E. V. Potter. 1948. 14 pp., 5 figs. Describes a method for determining silver content of an ore or concentrate sample by burning it in an electric arc and photographically recording the resulting colors.
- RI 4378. Investigation of Majuba Hill Copper-Tin Mine, Pershing County, Nev., by E. J. Matson. 1948. 10 pp., 5 figs. In 1943 Bureau investigated this mine in search of extensions to known deposits and studied the grade of copper and tin ore. Investigation consisted of sampling, long-hole drilling, underground excavation, and ore-dressing tests.
- RI 4379. Central Kansas Clay Deposits, by W. D. McMillan and Arthur O. Willson. 1948. 38 pp., 9 figs. Describes a study of clay deposits in north-central Kansas. In 1943 Bureau drilled 143 hand auger holes and excavated 26 trenches and 2 test pits on an area about 40 to 120 miles in extent.
- RI 4380. Investigation of the Hamme Tungsten District, Vance County, N.C., and Mecklenburg County, Va., by Frank K. McIntosh. 1948. 6 pp., 33 figs. During the investigation of Hamme tungsten district in 1943 Bureau did 2,085 linear feet of hand trenching and 7,904 linear feet of bulldozer trenching, constructed 17,000 feet of temporary road, collected 1,576 samples and assayed 501 of them, and diamond-drilled 41 drill holes, totaling 7,083.4 feet.
- RI 4381. Review of Bureau of Mines Work On Use of Diesel Engines Underground, by Martin A. Elliott. 1948. 28 pp., 29 figs. According to results of tests completed on diesel engines over a 10-year period by Bureau and summarized in this publication, diesel locomotives and engines may be operated safely in underground coal mines provided certain ventilating precautions are taken and potential explosion and fire hazards are eliminated. Photographs, charts, and detailed information on various Bureau tests are included.
- RI 4382. Ignition of Firedamp by Explosives, by Bernard Lewis and Guenther von Elbe. 1948. 11 pp., 3 figs. Discusses role of compression, heat conduction, and diffusion in the ignition of firedamp by explosives; processes occurring in the zone of contact between firedamp atmosphere and detonation products from explosives; nature of primary flame; shock waves in ignition of firedamp; and relation of present theory to former theories.
- RI 4383. Investigation of Wood Chromite Mine Area, Lancaster County, Pa., by Frank K. McIntosh and McHenry Mosier. 1948. 5 pp., 3 figs. Following magnetometer and gravimeter surveys of Wood mine area, Bureau engineers in 1941 explored the property further by diamond-drilling 10 holes, totaling 2,272 feet, and trenching.
- RI 4384. Investigation of the Virgilina Copper District, Virginia and North Carolina, by A. W. Newberry, Alford Roos, Almon F. Robertson, L. A. Dahners, and C. J. Cohen. 1948. 12 pp., 25 figs. Bureau investigated Seaboard, High Hill, Durgy, and Blue Wing mines in the Virgilina copper district.
- RI 4385. Investigation of Vial Zinc Mine, Iowa County, Wis., by Alvin M. Cummings. 1948. 7 pp., 2 figs. In 1943 Bureau explored areas immediately north and west of the Vial mine. Twenty-nine churn-drill holes, aggregating 3,348 feet of bore, were completed.
- RI 4386. Investigation of Royal Princess Zinc-Lead Deposit, Jo Daviess County, Ill., by Stephen P. Holt. 1948. 13 pp., 5 figs. In 1946 and 1947 Bureau engineers put down five inclined diamond-drill holes, totaling 3,190.5 feet, to test for possible eastward extension of the Royal Princess ore deposit.
- RI 4387. Stress Analysis Applied to Underground Mining Problems. Part II. Stress Analysis Applied to Multiple Openings and Pillars, by Wilbur I. Duvall. 1948. 11 pp., 21 figs. Describes relationships between stress concentrations, which contribute to pillar and roof failures in underground mines, and size and shape of two or more openings and pillars. (See also RI 4192.)
- RI 4388. Investigation of Iron-Ore Reserves of Iron County, Utah (Supplement to RI 4076), by Paul T. Allsman. 1948. 3 pp. Estimated potential reserves of 500 million long tons of iron ore, including substantial tonnages of good-quality ore suitable for Western steel production, are available in Iron County. Investigation consisted of geophysical surveying, diamond-drilling, and channel sampling.
- RI 4389. Concentration of Oxide Manganese Ores From Northeastern Utah, Daggett Chief and Gray Hawk Properties, by R. Havens and J. A. McAllister. 1949. 14 pp. Describes results of metallurgical research by Bureau on oxide manganese ores from Northeastern Utah.
- RI 4390. Investigation of the Tennessee Zinc Co. Property, Bumpus Cove, Unicoi County, Tenn., by A. B. Clayton and R. L. Sayrs. 1949. 14 pp., 6 figs. Contains results of 9 diamond-drill holes, totaling 2,670 feet, drilled by Bureau in Bumpus Cove area.
- †RI 4391. Laboratory Studies of the Gravitational Drainage of Oil From Unconsolidated Sands, by R. V. Higgins and G. B. Shea. 1949. 15 pp., 9 figs. Describes construction and operation of a miniature laboratory oil field designed to assist oil operators in increasing oil recovery from partly depleted fields.

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- RI 4392. Investigation of the Electric Point and Gladstone Lead-Zinc Mines, Stevens County, Wash., by John W. Cole. 1949. 11 pp., 6 figs. In 1946 Bureau investigated the Electric Point and Gladstone lead-zinc mines. Fourteen thousand linear feet of trenches were excavated, and 94 samples were collected and analyzed for lead and zinc.
- RI 4393. Investigation of Limestone Deposits Near Arlington, Snohomish County, Wash., by Constantine C. Popoff. 1949. 7 pp., 4 figs. Bureau investigated limestone deposits in Washington by transit surveys of outcrops and surface workings, reconnaissance work in vicinity of deposits, and sampling.
- RI 4394. Perlite: Thermal Data and Energy Required for Expansion, by E. G. King, S. S. Todd, and K. K. Kelley. 1948. 15 pp., 9 figs. Describes a method developed by Bureau of Mines for calculating degree of heat required to expand perlite in various industrial processes.
- RI 4395. Investigation of Ely Mine Copper Deposit, Orange County, Vt., by H. P. Hermance, G. L. Neumann, and McHenry Mosier. 1949. 11 pp., 5 figs. In search of additional copper reserves Bureau sampled mine dumps, conducted geophysical surveys, and diamond-drilled 9 holes, totaling 3,229 feet, at Ely mine between 1942 and 1946.
- RI 4396. Sampling of Helen Beryl Pegmatite, Custer County S. Dak., by John Paul Gries. 1949. 14 pp., 3 figs. Describes sampling and beneficiation tests on Helen Beryl pegmatite.
- RI 4397. Investigation of Chestatee Copper and Pyrite Deposit, Lumpkin County, Ga., by M. E. Kline and W. A. Beck. 1949. 12 pp., 3 figs. In 1947 Bureau investigated Chestatee copper and pyrite deposit by diamond-drilling 11 holes, totaling 3,122.8 feet.
- RI 4398. Investigation of the Zinc-Lead Deposits in Horizons Below the Grand Falls Chert, Galena District, Cherokee County, Kans., by Otto Ruhl and Homer J. Ballinger. 1949. 119 pp., 4 figs. Between 1944 and 1946 Bureau explored two ore areas in Galena mining district. Ninety churn-drill holes, totaling 19,338 feet of bore, were completed.
- RI 4399. Core-Drill Testing for Base-Metal Mineralization Below the Hope Silver Mine, Granite County, Mont., by John W. Cole. 1949. 9 pp., 6 figs. Describes an investigation made by Bureau to determine extent of a base-metal producing area near Philipsburg, Mont. Two diamond-drill holes, totaling 3,545 feet, were drilled in 1946 and 1947.
- RI 4400. Investigation of the Sheep Creek Iron Deposits, Meagher County, Mont., by Glenn C. Reed. 1949. 9 pp., 6 figs. In 1943 and 1944 Bureau investigated the Sheep Creek iron deposits by trenching churn drilling, petrographic studies, and detailed beneficiation tests.
- RI 4401. Production of Lightweight Concrete Aggregates from Clays, Shales, Slates, and Other Materials, by John E. Conley, Hewitt Wilson, T. A. Klinefelter, and others. 1948. 121 pp., 67 figs. Describes an investigation undertaken to determine availability of suitable raw materials and to study methods, procedures, and equipment to supply need for lightweight aggregate for use in concrete products and structures. Includes bibliography and list of United States patents.
- RI 4402. Gaseous Reduction Methods for the Production of Sponge Iron, by Edward P. Barrett. 1949. 45 pp., 23 figs. Describes methods, proposed or tried within the past 100 years, for producing sponge iron by treating hot ore with heated reducing gases.
- RI 4403. Investigation of Valzinco Lead-Zinc Mine, Spotsylvania County, Va., by Wesley A. Grosh. 1949. 7 pp., 7 figs. In search of additional ore reserves Bureau diamond-drilled 9 holes, totaling 4,213 feet, on this property during 1943. Six hundred and twelve drill-hole samples were collected for assay.
- RI 4404. Investigation of Broughton and Ring Magnetite Deposits, Essex County, N.Y., by Robert S. Sanford and L. H. Stone. 1949. 4 pp., 3 figs. In 1943 and 1944 Bureau conducted a magnetometer survey of the Broughton and Ring magnetite deposits and core-drilled a hole 483 feet deep on the Ring property.
- †RI 4405. Effect of Operating Variables Upon the Fischer-Tropsch Synthesis, by Sol Weller. 1949. 8 pp., 4 figs. Discusses variable operating factors affecting the yield of synthetic-liquid-fuel products from Fischer-Tropsch process.
- RI 4406. Investigation of Big Ben Molybdenum Deposit, Neihart District, Cascade County, Mont., by J. A. Herdlick. 1949. 22 pp., 3 figs. In 1943 Bureau investigated the Big Ben molybdenum deposit by diamond core drilling, channel sampling, metallurgical testing, and surveying.
- RI 4407. Thermochemical Study of the Stability Relation of Geikielite and Ilmenite in Rocks, by Th. G. Sahama and D. R. Torgeson. 1949. 14 pp., 2 figs. Contains some new heat-of-solution measurements of geikielite, ilmenite, fayalite, and a natural forsterite in mixed acid, and gives results of a thermodynamic attack on the problem of stability of geikielite in rocks. Work done in cooperation with Geophysical Laboratory of Carnegie Institution of Washington.
- RI 4408. Thermochemical Study of the Olivines and Orthopyroxenes, by Th. G. Sahama and D. R. Torgeson. 1949. 24 pp., 1 fig. Contains some new thermodynamic data for silicates and gives results of a thermodynamic attack on problems of stability and parageneses. Work done in cooperation with Geophysical Laboratory of Carnegie Institution of Washington.
- RI 4409. Investigation of Blister Mica Mine, Cheshire County, N.H., by S. Benedict Levin and McHenry Mosier. 1949. 12 pp., 6 figs. In 1944 Bureau investigated the Blister mica mine by core-drilling 6 holes, aggregating 913 feet.
- RI 4410. Investigation of Big Mica Mine, Cheshire County, N.H., by S. Benedict Levin and McHenry Mosier. 1949. 16 pp., 5 figs. In 1944 Bureau investigated the Big mica mine by diamond-drilling 9 holes, totaling 1,474 feet.
- RI 4411. Investigation of Eve Mills Zinc Deposit, Monroe County, Tenn., by Richard L. Sayrs. 1949. 5 pp., 5 figs. The Eve Mills zinc deposit was investigated by Bureau in 1943 and 1944. Thirty-two diamond-drill holes, totaling 11,649 feet, were drilled.
- RI 4412. Investigation of Black Mountain Beryl Deposit, Oxford County, Maine, by E. E. Maillot, Margaret F. Boos, and McHenry Mosier. 1949. 10 pp., 7 figs. In 1943 Bureau investigated the Black Mountain beryl deposit by diamond-drilling 11 holes, totaling 1,295.6 feet.
- RI 4413. Estimated Cost of Producing Heavy Fuel Oil by Hydrogenation of Coal, by L. L. Hirst, L. C. Skinner, E. A. Clarke, R. W. Dougherty, and H. D. Levene. 1948. 53 pp., 11 figs. This investigation was made to determine investment and operating costs of suitable processes that could produce heavy fuel oil, using coal from deposits short distances from the points of use.
- RI 4414. Investigation of the Kobuk River Asbestos Deposits, Kobuk District, Northwestern Alaska, by H. E. Heide, W. S. Wright, and F. A. Rutledge. 1949. 25 pp., 16 figs. Bureau investigated asbestos deposits in the Kobuk district, Alaska, during 1944, 1945, and

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Reports of Investigations

1946. Discusses procedures of sampling the deposits and presents results of beneficiation tests.
- RI 4415. Investigation of Zinc-Lead Deposits on Extensions of the Miami Trough, Ottawa County, Okla., and Cherokee County, Kans., by Clinton C. Knox. 1949. 35 pp., 8 figs. Between October 1944 and April 1947 Bureau investigated the MacArthur, Garrett, Stebbins-Karcher, and Crowe deposits in the Miami zinc-lead area. Forty-one churn-drill holes were bored.
- RI 4416. Investigation of Whiteware Clay Deposit, Fergus County, Mont., by R. N. Roby and Almon F. Robertson. 1949. 11 pp., 3 figs. In 1943 Bureau explored the Whiteware clay deposit by excavating 29 trenches and diamond-drilling 13 holes, totaling 1,241 feet.
- RI 4417. Investigation of Parker and Webb Zinc Deposits, St. Lawrence County, N.Y., by H. P. Hermance and Robert S. Sanford. 1949. 31 pp., 5 figs. Following previous core-drilling explorations of the St. Lawrence County properties by several private companies, Bureau diamond-drilled 11 holes, totaling 4,146.6 feet, in 1942 and 1943.
- RI 4418. Investigation of Potato Mountain Tin Placer Deposits, Seward Peninsula, Northwestern Alaska, by Harold E. Heide and F. A. Rutledge. 1949. 21 pp., 7 figs. In 1943 Bureau investigated the Potato Mountain tin placer deposits by drilling and trenching. Two-hundred and fifty-six holes were drilled, totaling 2,880 feet.
- RI 4419. Investigation of Claim Point Chromite Deposits, Kenai Peninsula, Alaska, by R. S. Sanford and J. W. Cole. 1949. 11 pp., 14 figs. After a preliminary investigation in July 1941, Bureau surface-sampled and core-drilled the Claim Point chromite deposits. Gives detailed information on drilling and beneficiation tests.
- RI 4420. Chemical Analysis of Clay, by Haskiel R. Shell. 1949. 36 pp., 1 fig. Describes a procedure for making precise and accurate analyses of clays, developed when ordinary methods of rock analysis proved unsatisfactory. Work done in cooperation with Tennessee Valley Authority.
- RI 4421. Investigation of Muir Inlet or Nunatak Molybdenum Deposits, Glacier Bay, Southeastern Alaska, by R. S. Sanford, G. A. Apell, and F. A. Rutledge. 1949. 6 pp., 8 figs. Describes an investigation made in 1942 and 1943 of molybdenum deposits in Glacier Bay district. Bureau engineers took 215 channel samples and diamond-drilled 2 holes, totaling 286 feet.
- RI 4422. Investigation of the Albright Farm Lead-Zinc Deposit, Blair County, Pa., by Donald F. Reed. 1949. 7 pp., 3 figs. In 1944 Bureau diamond-drilled 3 holes, totaling 702.7 feet, on Albright Farm Deposit.
- RI 4423. Investigation of Cheever Limonite Deposit, Berkshire County, Mass., by R. J. Burgess and Robert S. Sanford. 1949. 13 pp., 7 figs. In 1943 and 1944 Bureau made geophysical surveys and drilled 7 holes, totaling 1,793 feet, on Cheever limonite deposit.
- RI 4424. Survey of Commercial Aviation-Gasoline Characteristics, January 1948 Production, by W. C. Holliman, M. G. Barker, and Nancy Bobrowski. 1948. 16 pp., 11 figs. One of series on characteristics of commercial aviation gasolines, presents compilations of inspection data furnished on their products by 15 manufacturers of commercial grades of aviation gasoline and special data obtained in Bureau of Mines laboratories on 68 samples of these gasolines. Work done in cooperation with Coordinating Fuel and Equipment Research Committee of Coordinating Research Council, Inc. (See also RI 4273, 4353, and 4435.)
- RI 4425. Investigation of Portland Beryl-Mica District, Middlesex County, Conn., by M. F. Boos, E. E. Maillot, and McHenry Mosier. 1949. 26 pp., 21 figs. Describes results of investigation of three beryl-mica deposits in Portland Township by Bureau in 1943.
- RI 4426. Investigation of Talladega Gray Iron Ores, Talladega County, Ala., by Donald F. Reed. 1949. 29 pp., 10 figs. In 1943 and 1944 about 13,000 feet of diamond drilling was done and 6,000 feet of trenches excavated and sampled by Bureau engineers. Contains detailed discussion of each property investigated, drill logs, and sampling results.
- RI 4427. Investigation of Certain High-Alumina Clays of Central Pennsylvania, by Robert S. Sanford. 1949. 12 pp., 4 figs. In 1944 Bureau investigated high-alumina clays of central Pennsylvania. Fifty-three core-drill holes, aggregating 3,104.6 feet, were bored; 12 test pits, aggregating 133.5 feet, were excavated; and 250 samples were taken.
- RI 4428. Missouri Valley Manganese Deposits, South Dakota. Part II. Drill-Hole Logs and Sections, by Paul E. Pesonen, Edward L. Tullis, and Paul Zinner. 1949. 63 pp., 48 figs. Presents summarized logs of each drill hole completed during an investigation of Missouri Valley manganese deposits by Bureau between July 1945 and August 1947. Work done in cooperation with United States Department of the Interior agencies participating in the Missouri Basin Development Plan. (See also RI 4375 and 4429.)
- RI 4429. Missouri Valley Manganese Deposits, South Dakota. Part III. Mining and Beneficiation Studies, by Paul Zinner and W. A. Grosh. 1949. 56 pp., 37 figs. This report, describing mining and beneficiation tests, is the third in a three-part report on South Dakota manganese-bearing shale. The Missouri Valley deposits of South Dakota form the largest known reserve of manganese in this country, but they present complex problems of treatment. Work done in cooperation with other agencies of the United States Department of the Interior participating in the Missouri Basin Development Plan. (See also RI 4375 and 4428.)
- RI 4430. Secondary Recovery of Oil by Gas Injection in the Boggs Field, Roane County, W. Va., by E. M. Tignor, Thomas Jennings, and Leon Krause. 1949. 31 pp., 16 figs. Presents results of study made by Bureau engineers of secondary oil-recovery operations into the reservoir to stimulate production of oil from a so-called stripper field, available production records of all wells, gas-injection operations, and summary of reservoir analysis.
- RI 4431. Investigation of Copper-Nickel Deposits of the Stillwater Complex, Stillwater and Sweetgrass Counties, Mont., by Robert N. Roby. 1949. 10 pp., 7 figs. In 1941 Bureau of Mines diamond-drilled 8 holes, totaling 5,981 feet, and collected and analyzed 779 core and sludge samples.
- RI 4432. Magnetic Surveys of Certain Magnetite Deposits in New Jersey. Part II. Morris, Passaic, Sussex, and Warren Counties. Supplement to RI 4225, by J. A. Stampe, McHenry Mosier, and others. 1949. 8 pp., 42 figs. From 1942 to 1945 Bureau ran magnetic surveys, totaling more than 533,000 feet, at 30 deposits of magnetite in northern New Jersey. Contains maps showing results obtained at each deposit, analyses of ore, and description of deposits.
- RI 4433. Investigation of Sweetsprings Manganese Deposits, Monroe County, W. Va., and Craig County, Va., by Harold B. Ewoldt and Robert S. Sanford. 1949. 5 pp., 11 figs. In 1942 Bureau investigated the Sweetsprings manganese deposits by churn-drilling 24 holes, totaling 2,084 feet, sinking 420 feet of test pits, and driving 12 drifts and crosscuts, totaling 139 feet.
- RI 4434. Investigation of Douglas Fluorite Property, Pope County, Ill., by O. M. Bishop and A. B. Needham. 1949. 13 pp., 2 figs. In 1943 and 1944 Bureau



- investigated the Douglas fluorite property by drilling 15 holes, totaling 3,578 feet.
- RI 4435. Survey of Commercial Aviation-Gasoline Characteristics, July 1948 Production, by W. C. Holliman, M. G. Barker, and Nancy Bobrowski. 1948. 17 pp., 11 figs. One of series on characteristics of commercial aviation gasolines, presents compilations of inspection test data furnished on their products by 16 manufacturers of commercial grades of aviation gasoline and special data obtained in Bureau of Mines laboratories on 66 samples of these gasolines. Work done in cooperation with Coordinating Fuels and Equipment Research Committee of Coordinating Research Council, Inc. (See also RI 4273, 4353, and 4424.)
- RI 4436. Investigation of Bolling Springs Manganese-Iron Deposits, Cumberland County, Pa., by S. E. Burton and Robert S. Sanford. 1949. 20 pp., 5 figs. Between 1942 and 1944 Bureau investigated the Bolling Springs deposits by shaft sinking, churn drilling, and driving a short adit.
- RI 4437. Investigation of the Lander Phosphate Rock Deposits, Fremont County, Wyo., by William H. King and John I. Schumacher. 1949. 12 pp., 4 figs. Describes investigation of two phosphate deposits in the Wind River Mountains of Wyoming made to help Government and industry determine probable mining and ore-treatment costs. Bureau engineers drilled 3 holes, totaling 871 feet, in Macfie Ranch deposit and 8 holes, totaling 717 feet, in Twin Creek area.
- RI 4438. Investigation of Suffern Graphite Deposits, Rockland County, N.Y., by W. T. Millar and Robert S. Sanford. 1949. 6 pp., 2 figs. In 1943 Bureau excavated 5 test trenches and collected 11 samples for beneficiation tests.
- RI 4439. Concentration of Oxide Manganese Ores From the Adams and Woody Properties, Coconino County, Near Peach Springs, Ariz., by George M. Potter and Richard Havens. 1949. 10 pp. Gives results of ore-dressing studies made on two samples of ore from the Adams and Woody properties.
- RI 4440. Pilot-Plant Concentration of Arkansas Aluminum Ores, by S. M. Runke, E. G. Howe, J. S. Kennedy, and H. Kenworthy. 1949. 38 pp., 11 figs. Describes pilot-plant tests by Bureau to produce high-grade alumina concentrates from low-grade bauxite.
- RI 4441. Concentration of Oxide Manganese Ores From the Turtle Claims and Pacific Coast Manganese Properties, Paymaster District, Imperial County, Calif., by W. W. Agey and B. K. Shibley. 1949. 9 pp. Gives results of ore-dressing studies made on three samples of oxide manganese ore from the Turtle and Pacific Mining Co. Deposits, Paymaster district.
- RI 4442. Metallurgical Investigations of the Recovery of Zinc and Iron Sulfides From the Gray Zinc-Iron Deposit, Galena, Ill., by H. Kenworthy. 1949. 12 pp. Describes successful laboratory concentration of zinc-iron ore from the Gray deposit and suggests methods for reducing costs of milling this ore.
- RI 4443. Investigation of Anson Betts Manganese Mine, Hampshire County, Mass., by McHenry Mosier and M. L. Thomas. 1949. 8 pp., 6 figs. Four holes, totaling 1,072.5 feet, were diamond-drilled by Bureau in 1943.
- †RI 4444. National Motor-Gasoline Survey, Summer 1948, by O. C. Blade. 1948. 33 pp., 3 figs. Survey includes service-station gasolines of 115 major and minor companies and contains analytical data for 2,997 samples of gasolines from 17 marketing areas of the country. Work done in cooperation with American Petroleum Institute.
- RI 4445. Beneficiation of Oxide and Silicate Manganese Ores From Crook, Albany, and Washakie Counties, Wyo., by B. K. Shibley and H. D. Snedden. 1949. 16 pp. Gives results of ore-dressing studies conducted on three samples of oxide and silicate manganese ores from the Caulkins-McGuckin property, the J.B.C. Mining Co., and the Gheen property in Wyoming.
- RI 4446. Investigation of Rodham Mine Zinc and Lead Area, Lafayette County, Wis., by James V. Kelly. 1949. 6 pp., 1 fig. In 1947 Bureau diamond-drilled 5 holes, totaling 1,192 feet, to investigate further a mineralized area drilled in part by a private concern.
- RI 4447. Further Investigations of the Redford-Clayburg Magnetite District, Clinton County, N.Y., Supplement to RI 4003, by D. F. Reed and C. J. Cohen. 1949. 14 pp., 11 figs. Following earlier investigations of the Redford-Clayburg district, Bureau engineers in 1946 and 1947 explored this area further by magnetic surveys and diamond-drilling operations.
- RI 4448. Coal-Mining Methods and Practices in Western Arkansas, Preliminary Investigation, by Albert L. Toenges and Edward L. Fish. 1949. 25 pp., 7 figs. Describes preliminary study of mining systems used in western Arkansas coal mines by Bureau at request of State Division of Geology, Arkansas Resources and Development Commission, and Arkansas-Oklahoma Coal Operators Association.
- RI 4449. Preliminary Ceramic Tests of Clays From Seven Pacific Northwest Deposits, by Kenneth G. Skinner and Hal J. Kelly. 1949. 59 pp., 47 figs. Describes tests to determine suitability of seven Pacific Northwest clay deposits for producing refractories needed by metallurgical, chemical, and allied industries on Pacific coast. Work done in cooperation with College of Mines, University of Washington.
- †RI 4450. Petroleum-Engineering Study of the West Red River Field, Tillman County, Okla., by H. B. Hill, Kenneth H. Johnston, T. L. Coleman, and J. M. Seward. 1949. 97 pp., 35 figs. Discusses development of West Red River field where wells and equipment had to be protected against floods, sandstorms, and tornadoes; describes some subsurface problems met during development of the field; interprets reservoir conditions in the field; and records production history of a lenticular sand reservoir in which productivity of the wells probably results from local sand conditions rather than structure. Work done in cooperation with Federal Geological survey.
- RI 4451. Investigation of Pickering Creek Lead-Zinc Deposits, Chester County, Pa., by Donald F. Reed. 1949. 11 pp., 2 figs. In 1947 and 1948 Bureau diamond-drilled 8 holes, aggregating 2,820 feet.

†Out of print.

Reports of Investigations

- RI 4452. Filled-Sink Iron Deposits in Crawford, Dent, Franklin, and Texas Counties, Mo., by Leon W. Dupuy and Homer J. Ballinger. 1949. 23 pp., 15 figs. Searching for additional reserves of iron ore, Bureau of Mines churn-drilled 32 holes, totaling 4,006 feet, on 7 properties in Missouri in 1943.
- RI 4453. Investigation of Rush Creek Lead-Zinc Deposit, Mono County, Calif., by E. J. Matson. 1949. 4 pp., 3 figs. In 1946 and 1947 Bureau investigated the Rush Creek lead-zinc deposit. Five diamond-drill holes were completed, totaling 949 linear feet.
- RI 4454. Investigation of Running Wolf Iron Deposits, Judith Basin County, Mont., by Robert N. Roby. 1949. 7 pp., 3 figs. In 1943 and 1944 Bureau explored the Running Wolf iron deposits by trenching and diamond drilling. Presents factual data obtained during these operations.
- †RI 4455. Petroleum-Engineering Study of Atlanta Oil Field, Columbia County, Ark., by C. H. Riggs. 1949. 55 pp., 23 figs. Describes reservoir conditions and oil-production history of Atlanta oil field, considered one of the important Smackover limestone fields in southern Arkansas. Work done in cooperation with Arkansas Oil and Gas Commission.
- †RI 4456. Synthetic Liquid Fuels. Annual Report of the Secretary of the Interior for 1948. Part I. Oil from Coal. 149. 62 pp., 67 figs. Summarizes progress made by Bureau in 1948 toward development of industrial methods for producing synthetic liquid fuels from coal.
- †RI 4457. Synthetic Liquid Fuels. Annual Report of the Secretary of the Interior for 1948. Part II. Oil From Oil Shale, 1949. 56 pp., 89 figs. Summarizes progress made by Bureau in 1948 toward development of industrial methods for producing synthetic liquid fuels from oil shale.
- RI 4458. Synthetic Liquid Fuels. Annual Report of the Secretary of the Interior for 1948. Part III. Liquid Fuels From Agricultural Residues. Part IV. Secondary Recovery and Petroleum Chemistry and Refining Research. 1949. 25 pp., 8 figs. Summarizes progress made by Bureau in 1948 toward development of industrial methods for producing synthetic liquid fuels from agricultural residues and describes research on secondary recovery methods as applied to stripper oil fields and in refining of petroleum.
- RI 4459. Physical Properties of Mine Rock. Part 1, by S. L. Windes. 1949. 79 pp., 10 figs. Lists and describes characteristics of more than 100 rock types obtained from various operating mines and mineral-investigation projects. (See also RI 4727.)
- RI 4460. Explosive Properties of Hydrazine, by Frank E. Scott, John J. Burns, and Bernard Lewis. 1949. 18 pp., 5 figs. Discusses explosive properties of hydrazine, including sensitivity to impact, sensitivity to friction, sensitivity to electrostatic discharges, ignition temperatures, and limits of flammability.
- †RI 4461. A Method for the Spectrochemical Determination of Thallium in Ores, Concentrates, Dusts, and Chemicals, by Graham W. Marks and E. V. Potter. 1949. 13 pp., 8 figs. Describes a spectrochemical method adapted by Bureau physicists for speedily determining thallium content of an ore, concentrate, dust, or chemical sample.
- RI 4462. Lime-Soda Sinter Process for Alumina From High-silica Bauxites: Laboratory and Pilot-Plant Tests, by John E. Conley and Milford L. Skow. 1949. 67 pp., 11 figs. Covers Bureau's research to determine the effectiveness of using lime-soda sinter process to recover alumina from low-grade ores, describes laboratory experiments and pilot-plant tests, and presents flow sheets of the process.
- RI 4463. A Tentative Titanium-Nickel Diagram, by J. R. Long, E. T. Hays, D. C. Root, and C. E. Armantrout. 1949. 13 pp., 30 figs. Presents data obtained in study of phase relationships in titanium-nickel alloys under investigation. Contains a quasi-binary diagram that effectively summarizes this data.
- RI 4464. Sheath Working of Metal Powders, by James R. Long and Earl T. Hayes. 1949. 18 pp., 24 figs. Describes investigation undertaken to improve the technique for consolidation of titanium powder into solid nonporous metal.
- †RI 4465. The "Carbon-Oxygen Complex" as a Possible Initiator of Explosions and Formation of Carbon Monoxide in Compressed-Air Systems, by H. W. Busch, L. B. Berger, and H. H. Schrenk. 1949. 22 pp., 13 figs. Discusses explosions and formation of carbon monoxide in compressed-air systems and the carbon-oxygen complex and describes experiments with carbon deposits from air compressors.
- RI 4466. Concentration of Oxide Manganese Ores From Columbia and Elberta Mining Districts, Tooele and Juab Counties, Utah (Wildcat, Sharp, and Aeronaut No. 1 Properties), by K. C. Dean and K. C. Vincent. 1949. 11 pp. Gives results of laboratory tests on three Utah oxide-manganese-ore deposits.
- RI 4467. Some Chemicals From Synthetic Liquid Fuels Processes, by Norma Golumbic. 1949. 58 pp., 6 figs. Describes Fischer-Tropsch and related processes and discusses primary and secondary products and their uses. Reviews Bureau's work on hydrogenation of typical United States coals, including a description of assay procedure, and summarizes results obtained during hydrogenation of Pittsburgh-seam (Bruceton) coal under various conditions in Bureau of Mines pilot plants.
- RI 4468. Sampling the Kennedy Zinc Tailing Pile, Lafayette County, Wis., by A. M. Cummings. 1949. 7 pp., 2 figs. In 1943 Bureau sank 46 auger holes, ranging to 40 feet in depth and totaling 886.5 feet of bore. As a result of the findings, a flotation mill was erected at the site, and 254,791 tons of tailing were re-treated.
- RI 4469. Investigation of Red-Back Magnetite Mine, Sterling Lake, Orange County, N. Y., by W. T. Millar, H. O. Hammond, and Robert S. Sanford. 1949. 4 pp., 9 figs. Following a preliminary investigation of the Red-Back mine, Bureau of Mines explored the property further by diamond-drilling 7 holes, totaling 2,727.6 feet in 1943-44.
- RI 4470. Investigation of Coyote Creek Antimony Deposits, Garfield County, Utah, by W. M. Traver. 1949. 18 pp., 6 figs. In 1941 and 1942 Bureau explored the Coyote Creek antimony deposits. Ninety-six trenches were dug and 541 samples taken.
- RI 4471. Investigation of Virgin River Manganese Deposit, Clark County, Nev., by William H. King, John H. Soulé, and Russell R. Trengove. 1949. 6 pp., 4 figs. Following a preliminary examination of the Virgin River manganese deposit, Bureau explored the property further in 1941 and 1942 by diamond-drilling 18 holes, totaling 4,277 feet, to determine extent of manganese ore bodies exposed by the outcrop and to discover others that might be present at moderate depths.
- RI 4472. Investigation of Silica Deposits Near the Skagit River, Skagit County, Wash., by C. C. Popoff. 1949. 16 pp., 5 figs. Gives results of an investigation in 1946 by Bureau of silica samples near the Skagit River, Wash. Twenty-one samples were taken from the Stoner, Bacon Creek, and Presentin deposits.
- RI 4473. Flammability of Methyl Alcohol Vapor-Air Mixtures at Low Pressures, by G. W. Jones and F. E. Scott. 1949. 5 pp., 1 fig. Presents results of Bureau of Mines tests on limits of flammability of methyl alcohol vapor-air mixtures at reduced pressures.

†Out of print.

- RI 4474. Investigation of the Star Mine, Neihart District, Cascade County, Mont., by J. A. Herdlick. 1949. 12 pp., 3 figs. To insure continuous operation of the Star mine during the recent war, Bureau of Mines in 1944 explored a promising undeveloped area west of this lead-silver-zinc development by crosscutting and diamond drilling.
- RI 4475. Investigation of Tungsten Occurrences in Darwin District, Inyo County, Calif., by D. W. Butner. 1949. 6 pp., 10 figs. In 1941 and 1942 Bureau explored 18 localities in Darwin district for possible sources of tungsten ore. Trenches, totaling 3,106 feet, were excavated, and 567 samples were collected for analysis.
- RI 4476. Investigation of Sublette Ridge Vanadium Deposit, Lincoln County, Wyo., by Paul T. Allsman, Forest H. Majors, Stanford R. Mahoney, and W. A. Young. 1949. 8 pp., 2 figs. In 1942 Bureau investigated the Sublette Ridge vanadium deposit. Includes results of ore-dressing tests.
- RI 4477. Method of Assaying Oil Shale by a Modified Fischer Retort, Revision of RI 3977, by K. E. Stanfield and I. C. Frost. 1949. 13 pp., 8 figs. This report, a revision of RI 3977, Method of Assaying Oil Shale by a Modified Fischer Retort, published in 1946, presents a method of assaying oil shale that utilizes a modification of the Fischer cast-aluminum retort, commonly used for low-temperature coal carbonization. Shows effects of different experimental conditions upon oil yields by the modified Fischer retort and compares oil yields by this method with those obtained by former Bureau of Mines assay method. Work done in cooperation with University of Wyoming.
- RI 4478. Investigation of the Mohawk Lead-Zinc Mine, San Bernardino County, Calif., by Frank J. Wiebelt. 1949. 7 pp., 4 figs. In 1947 Bureau explored the Mohawk lead-zinc mine by diamond-drilling 10 holes, totaling 2,141.5 feet. Fifty samples were collected and assayed for lead, zinc, gold, and silver content.
- RI 4479. Investigation of the Waukon Iron Deposit, Allamakee County, Iowa, by Paul E. Pesonen. 1949. 22 pp., 2 figs. In 1943 Bureau investigated the Waukon iron deposit to determine extent of the ore-bearing material and its amenability to concentration. Seventy-one tests pits were sunk, and 35 of the test pits were channel sampled.
- RI 4480. Investigation of South Carthage Zinc-Lead Deposit, Jasper County, Mo., by Louis C. Brichta. 1949. 49 pp., 2 figs. In 1947 and 1948 Bureau put down 18 churn-drill holes, totaling 2,810 feet of bore, on the South Carthage zinc-lead deposit to ascertain whether enough low-grade ore remained to be mined by open-pit methods.
- RI 4481. Diamond Drilling in the Metaline District, Pend Oreille County, Wash., by N. L. Wimmeler and W. B. Cole. 1949. 25 pp., 11 figs. From January 1943 to August 1945 Bureau investigated 7 areas in the Metaline zinc-lead district, by diamond drilling 45 holes, totaling 38,149.69 feet.
- RI 4482. Electrolytic Manganese in Acid Electric Steel-Foundry Practice: Tests at National Malleable & Steel Castings Co., Sharon, Pa., by Frederick Sillers, Jr. 1949. 23 pp., 1 fig. Describes successful experimental use of electrolytic manganese in the production of steel castings and reviews metallurgical tests conducted in cooperation with National Malleable & Steel Castings Co.
- RI 4483. Investigation of Jamestown Fluorite Deposits, Boulder County, Colo., by John H. Hild and E. W. Ames. 1949. 10 pp., 8 figs. Between December 1945 and April 1947 Bureau investigated the Jamestown fluorite deposits. Bureau drilled 8 holes, aggregating 2,579.1 feet, on the Blue Jay deposit; 4 holes, aggregating 1,434 feet, on the Chancellor deposit; and one 350-foot hole on the Nations Treasure deposit.
- RI 4484. Investigation of Tin-Bearing Pegmatites in the Tinton Area, Lawrence County, S. Dak., by William F. Jahn and Paul E. Pesonen. 1949. 25 pp., 8 figs. In 1939 and 1940 Bureau investigated the Rough and Ready and Tantalum Hill mines in the Tinton area of the Black Hills of South Dakota. Four hundred and ninety-five samples were collected, 229 feet of drifting were completed, and 11 diamond-drill holes, totaling 4,000 feet, were bored.
- RI 4485. Investigation of the M. C. Zinc Mine, Lafayette County, Wis., by G. A. Appel. 1949. 8 pp., 2 figs. In 1947 Bureau investigated the M. C. zinc mine. Eighteen churn-drill holes, totaling 2,218 feet, and 3 diamond-drill holes, totaling 421.5 feet, were completed.
- RI 4486. Investigation and Laboratory Testing of Vermiculite Deposits, Llano County, Tex., by W. D. McMillan and A. W. Gerhardt. 1949. 42 pp., 10 figs. In 1947 Bureau investigated the Llano County vermiculite deposits. Three hundred and forty-two holes, aggregating 4,905.6 feet, were completed on 5 deposits; 377 samples were taken.
- RI 4487. Investigation of the Townsite Zinc and Lead Mine, Ottawa County, Okla., by Clinton C. Knox. 1949. 13 pp., 6 figs. Previous drilling on the northern part of this Ottawa County property had indicated a possible ore deposit of commercial grade, and in 1942 and 1943 Bureau continued the investigation by churn-drilling 20 holes, totaling 4,827 feet.
- RI 4488. Investigation of Rush Creek Zinc District, Marion County, Ark., by Louis C. Brichta. 1949. 15 pp., 2 figs. In 1942 United States Army Engineers, in cooperation with Bureau of Mines, explored the Marion County zinc deposit by diamond-drilling six holes.
- RI 4489. Investigation of the Kline and Frey Zinc Tracts, Wentworth Mining District, Lawrence and Newton Counties, Mo., by Louis C. Brichta. 1949. 27 pp., 6 figs. In 1943 and 1944 Bureau churn-drilled 58 holes, totaling 6,262.5 feet of bore, on this property.
- RI 4490. Zinc-Lead Ore Reserves of the Tri-State District, Missouri-Kansas-Oklahoma, by Otto Ruhl, Simeon A. Allen, and Stephen P. Hoyt. 1949. 59 pp., 8 figs. Zinc-lead ore reserves of the Tri-State district of Missouri-Kansas-Oklahoma are estimated at 66,100,000 tons of minable ore.
- RI 4491. Investigation of Vest Nickel Prospect, Floyd County, Va., by Wesley A. Grosh. 1949. 4 pp., 4 figs. In 1944 Bureau explored the Vest nickel prospect by diamond-drilling 2 holes, totaling 320 feet.
- RI 4492. Investigation of the Scarlet Copper Mine, Randolph County, N. C., by M. H. Kline and H. G. Dosh. 1949. 6 pp., 2 figs. In 1948 Bureau investigated the Scarlet copper mine. Three holes, totaling 530 feet, were diamond drilled.
- RI 4493. The Leadville Drainage Tunnel, Lake County, Colo., by Robert A. Elgin, M. E. Volin, and James W. Townsend. 1949. 37 pp., 21 figs. Describes how the Bureau of Mines drove more than a mile of tunnel into the famed Leadville mining district of Colorado during World War II as part of proposed 2½-mile drainage tunnel designed to drain several underground areas of excessive water and reestablish lead and zinc mining.
- RI 4494. Investigation of Copper-Bearing Pyrite Ores, Pyrition, Clay County, Ala., by H. D. Pallister and J. R. Thoenen. 1949. 15 pp., 7 figs. In 1948 Bureau investigated the copper-bearing pyrite ores at Pyrition by diamond-drilling 4 holes, totaling 1,583 feet, to determine possibility of developing a low-grade copper deposit and a pyrite deposit of sufficient reserve tonnage to be used as a source of sulfur.

Reports of Investigations

- RI 4495. Investigation of the Irwinton Bauxite District, Wilkinson County, Ga., by William A. Beck. 1949. 18 pp., 2 figs. In 1942 Bureau drilled 62 holes, totaling 3,841.5 feet, on 22 properties.
- RI 4496. Investigation of the Thompson Magnesium Well, Grand County, Utah, by C. L. Severy, M. H. Kline, and Paul T. Allsman. 1949. 21 pp., 8 figs. In drilling the 4,207-foot Reeder No. 1 well in magnesium-bearing deposits near Thompson, Utah, in cooperation with Federal Geological Survey as agents for Defense Plant Corporation, Bureau of Mines introduced an innovation in the recovery of cores of highly soluble salts by use of a wire-line core barrel. Drilling program was begun in May 1942 and completed 3 months later. Detailed descriptions of drilling procedure and sampling are included, with a log of the drill hole and a tabulation of core analyses.
- RI 4497. Investigation of Idol and Dalton Zinc Deposits, Grainger County, Tenn., by Richard L. Sayrs and Austin B. Clayton. 1949. 4 pp., 7 figs. In 1944, 6 holes, totaling 2,739 feet, were diamond drilled on the Idol property, and 8 holes, totaling 1,850 feet, were diamond drilled, and 3 pits were channel sampled on the Dalton property.
- RI 4498. Pilot-Plant Production of Steel From Sponge Iron, by W. W. Stephens and J. L. Morning. 1949. 21 pp., 5 figs. Gives results of tests in which steel was produced from sponge iron at the Bureau of Mines pilot plant at Redding, Calif. Describes and gives analyses of the several types of sponge iron that were used.
- RI 4499. Coal Hydrogenation: The Effect of Variations in the Coal-to-Vehicle Ratio, by Milton Orchin, G. L. Goldbach, Margaret Wolak, and H. H. Storch. 1949. 10 pp., 7 figs. On the theory that a vehicle such as tetralin functions by supplying hydrogen to the coal and that the high-pressure hydrogen present in the system serves to regenerate the tetralin, a series of experiments was planned in which varying quantities of tetralin were used with coal in the presence of high-pressure hydrogen.
- RI 4500. Anthracite Mechanical Mining Investigations. Progress Report 1. Preliminary Underground Tests of the Bureau of Mines Scraper-Shaker Loading Machine for Driving Gangways, by John W. Buch and Andrew Allan, Jr. 1949. 9 pp., 3 figs. The problem of increasing the rate of advance for driving gangways in thin, steeply pitching anthracite beds was investigated. Gives results of underground tests of Bureau of Mines scraper-shaker loading machine for driving gangways. (See also RI 4501, 4794, 4798, 4925, 4946, 4978, and 5013.)
- RI 4501. Anthracite Mechanical Mining Investigations. Progress Report 2. Preliminary Testing of Eickhoff Shearing Machine, Model DEK, by John W. Buch and Andrew Allan, Jr. 1949. 14 pp., 17 figs. Mechanical methods for improved performance of mining thin, steeply pitching anthracite beds above the gangway were studied. Report covers preliminary testing of 2 Eickhoff model DEK machines, 1 from England and 1 from Germany, to obtain mechanical operating data for use in determining the power requirements for cutting anthracite with machines of this design. (See also RI 4500.)
- RI 4502. Report of Research and Technologic Work on Explosives, Explosions, and Flames, Fiscal Years 1947 and 1948, by Bernard Lewis. 1949. 92 pp., 71 figs. Describing 2 years of explosives research, report includes tests on new and safer explosives for mines, on explosibility of ammonium nitrate fertilizer, hazards of industrial gases, vapors, and dusts, and improved methods of rock-dusting to prevent spread of coal-dust explosions.
- RI 4503. Investigation of Salt River Range Vanadium Deposits, Lincoln County, Wyo., by Paul T. Allsman, Forest H. Majors, Stanford Mahoney, and W. A. Young. 1949. 18 pp., 6 figs. In 1942 and 1943 Bureau investigated these vanadium deposits. Eighty-five trenches, 4 shafts, and 7 short tunnels were completed.
- RI 4504. Investigation of Keystone and St. George Copper-Zinc Deposits, Cochise County, Ariz., by T. M. Romslo. 1949. 21 pp., 14 figs. The Keystone and St. George properties were first examined by Bureau in 1942, surveyed again in 1945, and diamond drilled in 1947 and 1948. Twenty-two holes, totaling 10,067.8 feet, were diamond drilled.
- RI 4505. Investigation of Antimony Peak, Kern County, Calif., by G. D. Jermain and Spangler Ricker. 1949. 5 pp., 5 figs. In 1940 and 1941 Bureau explored the Antimony Peak district by an extensive trenching program, supplemented by reopening a series of old adits.
- RI 4506. Investigation of Montezuma and Chinati Zinc-Lead Deposits, Shafter District, Presidio County, Tex., by W. D. McMillan. 1949. 26 pp., 8 figs. Describes an investigation of the Montezuma and Chinati zinc-lead deposits in the Shafter district made in 1947 and 1948. Bureau operations included sinking a 52.5-foot vertical shaft, driving a 22-foot crosscut, and diamond-drilling 22 holes, totaling 2,698.5 feet.
- RI 4507. Investigation of Mica Deposits at the Victory, Jack Rabbit, Rainbow, and Midas Mines, Custer County, S. Dak., by A. B. Needham. 1949. 26 pp., 9 figs. Successfully demonstrating the feasibility of diamond drilling to determine the micropotentiality of a pegmatite deposit, Bureau of Mines drilled 9 diamond-drill holes, totaling 1,022.9 feet, on these Black Hills deposits in 1944.
- RI 4508. Lead-Zinc-Silver in the Poughkeepsie District and Part of the Upper Uncompagre and Mineral Point Districts, Ouray and San Juan Counties, Colo., by Scott W. Hazen, Jr. 1949. 110 pp., 34 figs. Reconnaissance work, mapping, and sampling were done in this area in 1946. Many of the old drifts covered by slides were reopened to permit access, and 392 mine openings were sampled, including 12,525 linear feet of underground workings.
- RI 4509. Investigation of the Alfred Davis Soapstone Deposits, Gillespie County, Tex., by W. D. McMillan. 1949. 9 pp., 3 figs. In 1947 Bureau core-drilled two holes to determine the depth of the Alfred Davis soapstone deposits and their physical, mineralogical, and chemical characteristics.
- RI 4510. Investigation of Whitehorse Limestone Deposits, Snohomish County, Wash., by Constantine C. Popoff. 1949. 9 pp., 4 figs. During 1946 Bureau investigated several limestone deposits near Fortson, Wash. Investigation consisted of reconnaissance work, transit surveys of the various outcrops and surface workings, and taking 26 samples for analysis.
- RI 4511. Investigation of Concentration Sections at the Central Mill of the Eagle-Picher Mining & Smelting Co., Cardin, Okla., by H. Kenworthy, W. A. Calhoun, and M. M. Fine. 1949. 37 pp., 8 figs. Describes methods of increasing efficiency of milling operations at Central mill of Eagle-Picher Mining & Smelting Co., Cardin, Okla. Includes detailed descriptions of ore-dressing processes employed at Central mill with flow sheets and tables showing results of various metallurgical tests.
- RI 4512. Investigation of Casper Mountain Chromite Deposits, Natrona County, Wyo., by F. W. Horton and Paul T. Allsman. 1949. 26 pp., 10 figs. In 1939 Bureau investigated a chromite deposit on the summit of Casper Mountain by trenching and diamond drilling.
- RI 4513. Investigation of Henderson Gulch Tungsten Deposit, Granite County, Mont., by Robert J. Hundhausen. 1949. 8 pp., 11 figs. In 1947 Bureau

- investigated the Henderson Gulch tungsten deposit by trenching, channel sampling, and mapping. Three old tunnels were rehabilitated and then sampled.
- RI 4514. Investigation of Capitan Iron Deposits, Lincoln County, N. Mex. Supplement to RI 4022, by John H. Soule. 1949. 5 pp., 8 figs. Supplements RI 4022, Capitan Iron Deposits, Lincoln County, N. Mex., issued in 1947, which describes development work by Bureau in 1944 on this property. In 1947 and 1948 Bureau investigated this property further by churn-drilling 7 holes, totaling 2,488 feet. Contains results of this investigation.
- RI 4515. Titanium Minerals in Central and North-eastern Florida, by J. R. Thoenen and J. D. Warne. 1949. 62 pp., 26 figs. Describes an exploration project conducted by Bureau in 1947 and 1948 in 10 northeastern and central Florida counties to determine extent and grade of deposits of "heavy sands" containing titanium, zircon, and other heavy minerals. Four hundred and thirty-three drive-pipe and 333 jet holes were drilled, and 7,293 bulk and core samples were taken.
- RI 4516. Investigation of Little Castle Creek Chromite Deposit, Shasta County, Calif., by E. J. Matson. 1949. 6 pp., 3 figs. In 1941 Bureau engineers explored the property further by trenching and sampling. Primary purpose of study was to search for a continuation of chromite mineralization.
- RI 4517. Analytical Distillation of Crude Oils at High Altitudes by the Bureau of Mines Routine Method, by Welton J. Wenger and John S. Ball. 1949. 9 pp., 4 figs. Through the development of pressure-control apparatus which minimizes effects of differences in barometric pressure, comparable distillation analyses of crude-oil samples can be obtained in petroleum laboratories at widely differing altitudes. Describes construction and operation of the pressure-control apparatus. Work done in cooperation with University of Wyoming.
- RI 4518. Examination, Mapping, and Sampling of Mine Shafts and Underground Workings, Leadville, Lake County, Colo., by Norman E. Ebbley, Jr., and John I. Schumacher. 1949. 115 pp., 60 figs. Descending into the earth in man-cages lowered by a portable hoisting machines, Bureau engineers examined 38 old mine shafts and underground workridges in the Leadville, Colo., mining district. Six hundred and fifty-eight samples of ores were chipped off by the engineers, and 7,331 pounds of complex ores were taken off for metallurgical testing.
- RI 4519. Production of Ductile Titanium at Boulder City, Nev., by F. S. Wartman, J. P. Walker, H. C. Fuller, M. A. Cook, and E. L. Anderson. 1949. 37 pp., 2 figs. Gives an account of the production of ductile-grade titanium powder in 100-pound batches by reduction of purified titanous chloride with magnesium, followed by grinding, leaching, and magnetic separation of the reaction product. Describes apparatus, technique, and methods of controlling product quality and gives some data on operating costs.
- RI 4520. Investigation of Coal Deposits in South Central Alaska and the Kenai Peninsula, by Albert L. Toenges and Theodore R. Jolley. 1949. 37 pp., 8 figs. Describes a preliminary survey of possible coal-mining sites in south central Alaska.
- RI 4521. Bauxite Investigations, Eufaula District, Barbour and Henry Counties, Ala., by S. A. Allen. 1949. 85 pp., 112 figs. Describes an investigation by Bureau from 1941 to 1945 in Barbour and Henry Counties that added 820,000 tons of recoverable, commercial grade bauxite to Nation's known reserves.
- RI 4522. Investigation of Carbonate King Zinc Mine (Crystal Cave Group), San Bernardino County, Calif., by Frank J. Wiebelt. 1949. 10 pp., 4 figs. In 1947 and 1948 Bureau drilled 8 diamond-drill holes, aggregating 2,121 feet, in an endeavor to establish extensions of the worked-out ore bodies and to develop new ones.
- RI 4523. Laboratory Study of Asphalts From Native Bitumens and Bituminous Sandstones, by Rethel L. Hubbard and K. E. Stanfield. 1949. 22 pp., 2 figs. Describes laboratory study of commercial suitability of asphalts extracted from bitumens and bituminous sandstones from western United States and Canada. Work done in cooperation with University of Wyoming.
- RI 4524. Concentration of Oxide Manganese Ores From Payday No. 1 and Newcomb properties, Weber and Rich Counties, Utah, by J. A. McAllister and Walter J. Long, Jr. 1949. 9 pp. To determine commercial suitability of manganese ores from the Payday and Newcomb claims, Bureau metallurgists subjected 2-ton representative samples to a variety of metallurgical treatments.
- RI 4525. Investigation of the New Idria Mercury Deposit, San Benito County, Calif., by Russell R. Tren-gove. 1949. 24 pp., 7 figs. The Bureau in cooperation with Federal Geological Survey explored the New Idria Quicksilver Mining Co. property at Idria, Calif., for additional mercury-ore bodies. Sixteen holes, aggregating 2,580 feet, were drilled by Bureau in 1941 and 1942.
- †RI 4526. Coal Carbonization: Ammonium Sulfate Yields From Coals of Various Regions of the United States, by D. A. Reynolds and D. E. Wolfson. 1949. 15 pp., 6 figs. This report supports belief that differences in the yield of ammonia at various chemical-recovery coking plants are due to inherent differences in the coals used as well as to different operating conditions. Gives ammonia yields from 58 coals carbonized by BM-AGA method.
- †RI 4527. Recovery of Alumina From Submarginal Bauxites. Part I. Electric Furnace Production of Calcium Aluminate and Ferroalloy, by Charles E. McCarthy, Richard S. Cole, Earl F. Nichols, Hewitt Wilson, and John A. Ruppert. 1949. 93 pp., 28 figs. A process for producing calcium aluminate and a silicon-bearing ferroalloy from low-grade bauxite, lime, coke, and iron scrap proved technically feasible in an electric furnace in Bureau tests at Norris, Tenn. A necessary combination of these minerals, together with power, is found in Arkansas, Alabama, and to a lesser extent, Oregon, and gives promise of using low-grade bauxite deposits in these States, according to this report. Work done in cooperation with Tennessee Valley Authority. (See also RI 4528.)
- RI 4528. Recovery of Alumina From Submarginal Bauxites. Part 2. Extraction of Alumina From Electric-Furnace Slags of Calcium Aluminate, by Maurice R. Thompson, Henry M. McLeod, Jr., and Milford L. Skow. 1949. 91 pp., 42 figs. Deals with leaching of electric-furnace calcium aluminate slag to produce solutions from which metallurgical-grade alumina can be recovered. Studies of the precipitation of alumina trihydrate from these solutions are included. Using a sodium carbonate solution, Bureau recovered about 77 percent of the alumina from ground calcium aluminate slag. (See also RI 4527.)
- RI 4529. Survey of Commercial Aviation-Gasoline Characteristics, January 1949 Production, by W. C. Holliman, M. G. Baker, and Nancy Bobrowski. 1949. 17 pp., 11 figs. Gives results of semiannual survey of aircraft motor fuels and includes laboratory analyses of 74 samples of various grades of aviation gasoline distributed to 17 manufacturers in this country. Work done in cooperation with Coordinating Fuel and Equipment Research Committee of Coordinating Research Council, Inc.

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Reports of Investigations

- RI 4530. Investigation of the Benjamin Franklin Graphite Mine (Government Owned) and the Just Graphite Mine, Chester County, Pa., by Robert S. Sanford and Frank D. Lamb. 1949. 17 pp., 3 figs. In 1948 Bureau investigated the Benjamin Franklin and Just graphite mines. Nine trenches, aggregating 1,880 feet, were excavated, 368 channel samples were cut, and 3 core-drill holes, totaling 435.7 feet, were completed.
- RI 4531. Sampling and Determination of Aldehydes in Diesel-Engine Exhaust Gas and in Mine Air, by Henry W. Busch and L. B. Berger. 1949. 9 pp., 2 figs. Describes sampling methods for determining aldehyde content of diesel-engine exhaust gas and of mine air. Studies were conducted with view to developing methods by which samples might be collected in the field and transported to the laboratory for analysis.
- RI 4532. Investigation of the Great Gossan Lead, Carroll County, Va., by M. H. Kline and T. J. Ballard. 1949. 39 pp., 25 figs. The Great Gossan Lead in Carroll County is one of the largest undeveloped sulfide ore bodies known in the eastern United States. It extends for 16.7 miles along the western slope of the Blue Ridge Mountains. In 1947 and 1948 Bureau diamond-drilled 25 holes, totaling 9,173 feet, on 2 segments of the deposit.
- RI 4533. Investigation of Lone Elm Zinc-Lead Deposit, Jasper County, Mo., by Louis C. Brichta. 1949. 29 pp., 2 figs. To develop enough zinc-lead reserves for open-pit mining, Bureau explored the Lone Elm zinc-lead deposit by churn-drilling 42 holes, totaling 2,788.5 feet of bore, in 1948. Descriptions of the system of drilling and sampling, with logs of holes drilled by Bureau and by Eagle-Picher Mining & Smelting Co., are included.
- †RI 4534. Guide for Making Cost Estimates for Chemical-Type Operations, by C. W. Van Noy, T. C. Dunville, R. G. Dressler, and C. C. Chaffee. 1949. 64 pp. Discusses cost factors and operating expenses involved in setting up chemical-type operations, such as plants for manufacturing synthetic liquid fuels, anhydrous ammonia, and products of a similar nature. Gives uniform method adaptable to many types of chemical plants for estimating operating expenses covering direct costs, indirect costs or burden, fixed costs, and other costs, including contingencies and distribution expense.
- RI 4535. Recovery of Aluminum From Crude Aluminum-Silicon Alloy by Extraction With Molten Zinc, by Hillary W. St. Clair and D. D. Blue. 1949. 24 pp., 6 figs. Describes results of Bureau of Mines tests to recover aluminum from crude aluminum-silicon alloy by extraction with molten zinc.
- RI 4536. Investigation of Manganese Deposits, Little Florida Mountains Mining District, Luna County, N. Mex., by A. M. Evans. 1949. 11 pp., 11 figs. In 1940 and 1941 Bureau investigated the Luna mine, the American group of claims, and the Manganese Valley mine. Surveys were conducted, 59 feet of shaft were sunk on the Manganese Valley mine, and the Luna mine was pumped out and rehabilitated.
- RI 4537. A Study of Stray Electric Currents in Airdox Systems in Coal Mines, by C. L. Brown, F. J. Gallagher, and John Hyvarinen. 1949. 13 pp., 11 figs. Discusses methods of controlling stray electric currents in the compressed-air lines installed in mines where Airdox, a permitted blasting device, is used for breaking down coal.
- RI 4538. Investigation of the Andersonville Bauxite District, Sumter, Macon, and Schley Counties, Ga., by William A. Beck. 1949. 150 pp., 22 figs. In 1941 Bureau in cooperation with Federal Geological Survey made a preliminary survey of the Andersonville bauxite district. From 1941 to 1943 Bureau drilled 1,192 holes and collected and analyzed 3,679 samples.
- RI 4539. Investigations of the Cartersville Manganese District, Bartow County, Ga., by A. L. Peyton and Walter T. Leweicki. 1949. 32 pp., 18 figs. After sampling manganese ore from the Cartersville deposits in 1941, Bureau engineers revisited the district in 1942 to reappraise local reserves in the light of the ore-dressing studies and to prepare a plan for district's development. Work by Bureau from 1943 to 1945 included bulldozer trenching, rotary bucket and churn drilling, sampling, and analytical determinations.
- RI 4540. Investigation of Snowball Fluorite Deposit, Maricopa County, Ariz., by Thomas C. Denton and Chas. A. Kumke. 1949. 15 pp., 3 figs. In 1944 Bureau explored a fluorite deposit on the Snowball property by trenching, diamond drilling, and sampling.
- RI 4541. Investigation of Comet Coalition Lead-Zinc Deposit, Lincoln County, Nev., by Russell R. Trenslove. 1949. 6 pp., 8 figs. In 1947 Bureau diamond-drilled 3 holes, totaling 2,967 feet, and assayed 37 samples.
- RI 4542. Investigation of Oat Hill Mercury Mine, Napa County, Calif., by Fremont T. Johnson and Spangler Ricker. 1949. 23 pp., 5 figs. In 1943 and 1944 Bureau investigated the Oat Hill mercury mine. Twenty-eight holes, aggregating 8,121 feet, were diamond drilled.
- RI 4543. Investigation of the Strawberry Tungsten Deposit, Madera County, Calif., by Russell R. Trenslove. 1949. 19 pp., 14 figs. Describes an investigation of the Strawberry tungsten deposit. In 1948 Bureau diamond-drilled 8 holes, aggregating 1,937 feet, and analyzed 78 drill-hole samples.
- RI 4544. Diamond Drilling at the Rambler Copper Mine, Albany County, Wyo., by John I. Kasteler and Eugene Frey. 1949. 6 pp., 7 figs. In 1942 and 1943 Bureau conducted a development project on the property. Assay determinations and spectrographic analyses were made on 11 samples from diamond-drill holes, and assay determinations were made on 23 samples from a mine dump.
- RI 4545. Concentration of Oxide Manganese Ores From the Tintic District, Eureka, Juab County, Utah, by A. O. Ipsen, H. D. Snedden, and H. L. Gibbs. 1949. 18 pp. Concentration tests were made on samples from the Tintic Standard mine, the Oxen No. 5974 claim, and the Fields property.
- RI 4546. Studies of the Kinetics of Coal Hydrogenation, by M. G. Pelipetz, E. M. Kuhn, S. Friedman, and H. H. Storch. 1949. 9 pp., 9 figs. Reports interpretive studies by Bureau of Mines to determine effect of pressure, temperature, and reaction time on the coal-hydrogenation process.
- RI 4547. The Determination of Low Concentrations of Hydrogen Sulfide in Gas by the Methylene Blue Method, by A. E. Sands, M. A. Grafus, H. W. Wainwright, and M. W. Wilson. 1949. 19 pp., 3 figs. An ultrasensitive method for rapidly detecting the presence of small quantities of hydrogen sulfide in gas is being used successfully in research at Bureau of Mines Synthesis Gas Production Laboratory at Morgantown, W. Va. Tested as part of a cooperative research program with West Virginia University on the production of synthesis gas from coal, method is used in studying the purification necessary to meet the rigorous standards for gas used in Fischer-Tropsch synthesis of liquid fuels.
- †RI 4548. A Bureau of Mines Method for Determining Porosity: A List of Porosities of Oil Sands, by Cleo Griffith Rall and D. B. Tallafarro. 1949. 28 pp., 4 figs. Describes a method developed by Bureau for accurately determining the porosity of oil- and gas-bearing sands in a matter of minutes. The method was developed at Petroleum Experiment Station at

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- Bartlesville, Okla., as a part of Bureau's research on fluid-energy relationships and on methods of improving the recovery of crude oil from underground reservoirs. Work done in cooperation with State of Oklahoma.
- †RI 4549. Investigation of the Prairie Creek Diamond Area, Pike County, Ark., by J. R. Thoenen, Robert S. Hill, E. G. Howe, and S. M. Runke. 1949. 24 pp., 28 figs. Describes results of an investigation of the Prairie Creek diamond area by Bureau in 1943 and 1944 in an effort to establish a supplemental domestic source of supply. Describes the system of bucket drilling, sampling, and the concentration plant set up at Rolla, Mo., and includes pictures of equipment used, maps, a flow sheet of the washing and concentration procedure, drill-hole logs, and bibliography.
- RI 4550. Investigation of Hamilton County Bauxite District, Tennessee, by Frank K. McIntosh. 1949. 31 pp., 7 figs. In 1942 and 1943 Bureau engineers drilled 38 holes, totaling 2,519.5 feet, on this area.
- RI 4551. Concentration of Manganese Ores From Piute and Kane Counties, Southern Utah, by Richard Havens and W. W. Agey. 1949. 9 pp. Gives results of concentration of Blackbird ore from Piute County and Black John ore from Kane County.
- RI 4552. Coal Carbonization: Effects of Blending Pocahontas No. 3 Coal With 12 High-Volatile A Coals, by D. A. Reynolds. 1949. 8 pp., 3 figs. During the past few years, 12 high-volatile A coals were blended with Pocahontas No. 3 coal from Kimball, McDowell County, W. Va. Compares physical properties of the cokes from these high-volatile coals and their blends.
- RI 4553. Liquidus Temperatures and Liquid Densities of Zinc-Aluminum Alloys, by I. S. Solet and Hillary W. St. Clair. 1949. 6 pp., 2 figs. This study, made as part of a broader investigation on refining of scrap aluminum, describes measurement of liquidus temperatures and measurement of the density of molten alloys.
- RI 4554. Investigation of Colorado Minerals Co. Calcite Deposits, Archuleta and Hinsdale Counties, Colo., by Ernest V. Deshayes and S. R. Wilson. 1949. 7 pp., 4 figs. In 1943 Bureau examined the Colorado Minerals Co. calcite properties in Archuleta and Hinsdale Counties. The demand for optical calcite during the war prompted the examinations and resulting development programs on the Meadows and Seavy ranch properties near Pagosa Springs, Archuleta County. Development work on these two properties included shaft sinking and excavation of surface pits and trenches by bulldozer and hand methods.
- RI 4555. Investigation of the Springvale Bauxite District, Randolph County, Ga., by William A. Beck. 1949. 20 pp., 11 figs. In 1943 Bureau explored 5 properties in the Springvale bauxite district by drilling 388 holes. One hundred and sixty-four samples were taken and analyzed.
- RI 4556. Investigation of the Young America Lead-Zinc Deposit, Stevens County, Wash., by Robert J. Hundhausen. 1949. 13 pp., 8 figs. The Young America lead-zinc mine was investigated by Bureau during parts of 1946, 1947, and 1948. Maps were prepared, 2 small prospect trenches were excavated, and 15 diamond-drill holes, totaling 4,590.5 feet, were completed.
- †RI 4557. Effect of High Pressures on the Flammability of Natural Gas-Air-Nitrogen Mixtures, by G. W. Jones, R. E. Kennedy, and I. Spolan. 1949. 16 pp., 6 figs. Describes procedure followed and results obtained relative to the effect of pressure up to 3,000 pounds per square inch upon the limits of flammability of natural gas-air and natural gas-air-nitrogen mixtures.
- RI 4558. Investigation of the Abbott Quicksilver Mine, Lake County, Calif., by Frank J. Wiebelt. 1949. 11 pp., 3 figs. In 1948 Bureau investigated the Abbott quicksilver mine by diamond-drilling 6 holes, totaling 2,845 feet.
- RI 4559. Grouting Diamond-Drill Holes at the Christmas Mine, Gila County, Ariz., with Notes on the Setting Properties of Cements and the Use of Liquid Carbon Dioxide as a Pressuring Agent in Grouting, by Stanton L. Tainter. 1949. 10 pp., 5 figs. Describes grouting of diamond-drill holes at the Christmas mine, including pressure grouting with carbon dioxide gas and cementing through a grouting plug. Gives results of tests made to determine the type of cement most suitable for use on the Christmas project and the effect of water-cement ratio, temperature, and various admixtures on workability, setting time, and strength.
- RI 4560. Investigation of the Buckeye Manganese Deposits, Stanislaus County, Calif., by M. E. Volin and E. J. Matson. 1949. 7 pp., 9 figs. In 1940 and 1941 Bureau explored these manganese deposits by trenching, underground excavation, sampling, and core drilling.
- RI 4561. Investigation of the Dayton Iron Deposit, Lyon and Storey Counties, Nev., by Robert W. Geehan. 1949. 34 pp., 12 figs. Following a preliminary investigation of the Dayton iron deposit in 1941 and 1942, Bureau engineers explored the property further by test-pitting, trenching, sampling, and diamond drilling.
- RI 4562. Lead Smelting in the Ore Hearth. I: Problems Involved in Smelting Rich Charges, by G. L. Oldright. 1949. 18 pp. Describes a lead blast-furnace investigation on smelting richer lead products and gives problems involved. Work done in cooperation with Eagle-Picher Mining & Smelting Co. (See also RI 4563 and 4591.)
- RI 4563. Lead Smelting in the Ore Hearth. II. The Development of the Ore Hearth: Its Smelting Column, by G. L. Oldright. 1949. 43 pp. This report, second in a series on lead smelting in the ore hearth, describes development of the ore hearth in Missouri for smelting rich lead concentrations. Work done in cooperation with Eagle-Picher Mining & Smelting Co. (See also RI 4562 and 4591.)
- RI 4564. Estimated Plant and Operating Costs for Producing Gasoline by Coal Hydrogenation, by L. L. Hirst, J. A. Markovits, L. C. Skinner, R. W. Dougherty, and E. E. Donath. 1949. 83 pp., 23 figs. Bureau has prepared preliminary designs and calculated detailed investment costs from which the operating costs to produce 30,000 barrels per day of liquid products, mainly gasoline, by coal hydrogenation were obtained. Report offers two sets of cost calculations—one for a modernized plant, incorporating process improvements and the other for a conventional plant following European practice. Data are included to enable one to evaluate the cost for individual sections of the plant and to compare them with other established data for similar installations.
- RI 4565. Investigation of the Whitechuck Travertine Deposit Near Darrington, Snohomish County, Wash., by Constantine C. Popoff. 1949. 4 pp., 1 fig. In 1946 Bureau investigated the Whitechuck travertine deposit. The investigation included reconnaissance work in the district, a transit survey of the area of the travertine, and type sampling.
- RI 4566. Sulfur in Petroleum. III. Selected Physical Properties of Some Sulfur Compounds, by R. Vernon Helm, William E. Haines, and John S. Ball. 1949. 44 pp. As part of a cooperative research program designed to increase utilization of high-sulfur crude oils and thus conserve better grade crudes, report

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Reports of Investigations

- lists data on the physical properties of sulfur compounds most likely to be found in petroleum and its products and provides information useful in devising methods for removing these objectionable impurities. Work done in cooperation with University of Wyoming.
- RI 4567. National Motor-Gasoline Survey, Winter 1948-49, by O. C. Blade. 1949. 33 pp., 3 figs. Survey includes service-station gasolines of 130 major and minor companies and contains analytical data for 3,811 samples of gasolines from 17 marketing areas of the country. Work done in cooperation with American Petroleum Institute.
- RI 4568. Relation Between and Precision of Dust Counts (Light- and Dark-Field) From Simultaneous Impinger, Midget-Impinger, Electric-Precipitator, and Filter-Paper Samples, by Carlton E. Brown and H. H. Schrenk. 1949. 35 pp. Discusses dusts, samplers, collection of samples, counting dust of the samples (light- and dark-field), and relation between and precision of the dust counts (light- and dark-field).
- †RI 4569. Relative Reducibility of Some Iron Oxide Materials, by E. P. Barrett and C. E. Wood. 1949. 17 pp., 6 figs. Describes tests to develop a standard procedure for determining rapidly and accurately the relative reducibility of iron oxide materials in hydrogen, in carbon monoxide, and in mixtures of these gases.
- RI 4570. Flotation of Gray Iron Ores From the Talladega Area, Alabama: Laboratory Studies, by H. G. Iverson. 1949. 18 pp. Laboratory studies on beneficiating gray iron ores from Talladega County, Ala., show that acceptable blast-furnace feed may be recovered from low-grade ores by flotation and that this process, using relatively low-cost reagents, may be of commercial importance, according to this report. Describes ores treated and processes used and reviews previous beneficiation work, using reduction-roasting and magnetic-separation processes.
- RI 4571. Investigation of the Del Rio and Stackhouse Barite Deposits, Cocke County, Tenn., and Madison County, N. C., by Laurence A. Dahners. 1949. 26 pp., 13 figs. Prospecting for extensions of known ore bodies of barite—a mineral utilized as a weighting material in oil-well drilling and other important industrial applications—Bureau conducted a diamond-drilling project on three barite properties in eastern Tennessee and western North Carolina in 1944.
- RI 4572. Diamond-Drill and Auger Sampling of Vanadiferous Shale, Mercur Dome Mine, Tooele County, Utah, by William H. King and Stephen R. Wilson. 1949. 8 pp., 2 figs. Preliminary examination of the Mercur area by Bureau disclosed presence of vanadium—an important component of high-quality steels. Subsequently, in September and October 1943, Bureau engineers conducted a development program, consisting of diamond and auger drilling and sampling to determine extent and assay value of the vanadiferous bed.
- †RI 4573. Petrographic Determination of Quartz in the Presence of Claylike Minerals, by Wilder D. Foster. 1949. 13 pp., 3 figs. A method of examining rock particles microscopically to determine presence of quartz grains—important in evaluating the possible silicosis hazards of breathing dust—has been developed by Bureau scientists. This new technique involves adding a suitable compound to the sample which disperses the clay from the quartz fragments. Report includes charts and tables comparing petrographic and X-ray values for quartz both before and after using the dispersing oil and descriptions of handling and preparing samples examined.
- RI 4574. Flotation of Silver Chloride From an Oxide Ore, by A. L. Engel and T. A. Jackson. 1949. 5 pp. Gives results of flotation tests on ore from the Bullfrog district near Beatty, Nye County, Nev.
- RI 4575. Investigation of the K. T. Dome Zinc-Lead Mine, Owen and Henry Counties, Ky., by William A. Beck. 1949. 10 pp., 10 figs. To develop additional reserves on the K. T. Dome zinc-lead property, Bureau in 1948 diamond-drilled 4 holes, totaling 1,855.3 feet, on the south extension of the vein.
- RI 4576. Investigation of the McGuffey Creek Chromite Deposit, Siskiyou County, Calif., by Frank J. Wiebelt. 1949. 3 pp., 4 figs. Exploration of 2 chromite deposits in the McGuffey Creek area, Calif., by Bureau included 2,234 feet of diamond drilling, surface trenching, and sampling in 1942.
- RI 4577. Investigation of the Hermitage Bauxite District, Bartow and Floyd Counties, Ga., by Walter T. Lewiecki. 1949. 10 pp., 4 figs. In 1943 Bureau investigated the Hermitage bauxite district. Twenty-nine hand-auger holes, totaling 875 feet, were drilled.
- RI 4578. Investigation of the McCormick Chromite Mine, Tuolumne County, Calif., by John R. Shattuck and Spangler Ricker. 1949. 15 pp., 3 figs. Gives results of an investigation of the McCormick chromite mine. Work by Bureau included 190 feet of drifting and crosscutting, 10 feet of raising, 690 feet of jackhammer prospect holes, 67 feet of surface trenches, and drilling 11 diamond-drill holes, totaling 1,521 linear feet.
- RI 4579. Diamond Drilling at the Boston Consolidated Copper Mine, Salt Lake County, Utah, by Robert L. Jones and S. R. Wilson. 1949. 21 pp., 4 figs. Describes results of an investigation in 1943 and 1944 of the Boston Consolidated copper mine, which disclosed continuation of a copper-bearing mineral zone below the 800-foot level.
- RI 4580. Investigation of the Ladd Manganese Deposits, San Joaquin County, Calif., by M. E. Volin and E. J. Matson. 1949. 14 pp., 14 figs. In a development program at the Ladd and Fabian manganese mines, Calif., in 1940 and 1941 by Bureau, caved portals were reopened, 42 trenches were dug to expose the ore zone for sampling, 391 feet of drifting and crosscutting and 22 feet of raising were done, and 308 surface and underground channel samples were taken. Five holes, totaling 1,041 feet, were drilled in the Ladd area, and 5 holes, totaling 971 feet, were drilled in the Fabian area.
- RI 4581. A Gage and Recording Equipment for Measuring Dynamic Strain in Rock, by Leonard Obert and Wilbur I. Duvall. 1949. 11 pp., 14 figs. Describes the development of a dynamic strain gage and a companion amplifier and recording camera—an apparatus designed to pick up and record strain waves produced in rock by a nearby explosion.
- RI 4582. Recovery of Fumes From Chloride Volatilization of Gold, by A. L. Engel and H. J. Heinen. 1949. 13 pp. Describes investigations on the recovery, in an aqueous medium, of fumes from chloride volatilization of gold.
- RI 4583. Investigation of the Iron-Bearing Formation of Iron County, Mich., Utilizing Geophysical and Other Methods, by Paul Zinner, Clyde L. Holmberg, and Owen W. Terry. 1949. 40 pp., 22 figs. Describes geophysical methods and other methods used by Bureau in an investigation of iron-bearing formations in the Iron River-Crystal Falls district of Iron County in 1944.
- †RI 4584. Special Equipment in the Coal-Hydrogenation Demonstration Plant, by J. A. Markovits, K. O. Braun, J. T. Donovan, and J. H. Sandaker. 1950. 40 pp., 45 figs. Describes construction and engineering details of special equipment used in Bureau's Coal-Hydrogenation Demonstration Plant at Louisi-

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- ana, Mo., where coal is converted into oil and gasoline. In operation since 1949, plant took nearly 3 years to complete and cost several million dollars. Special apparatus had to be designed and built, since most of equipment was not available on regular commercial market.
- RI 4585. Differential Thermal Analysis Applied to the Lime-Soda Sinter Process, by A. J. Kauffman, Jr. 1949. 16 pp., 4 figs. Presents information on the characteristic heat reactions of bauxite, kaolin, and other high-aluminous materials obtained during a Bureau study of the recovery of alumina from domestic low-grade sources. To determine the varying temperatures required to recover alumina from high-aluminous materials by the lime-soda sinter process, Bureau investigators applied the differential thermal analysis method. Bibliography included.
- RI 4586. Magnetic Surveys in the Iron Springs District, Iron County, Utah, by Kenneth L. Cook. 1950. 78 pp., 45 figs. Gives results of magnetometer surveys made by Bureau of some of principal iron-ore deposits of Iron Springs district in 1944 and 1945. District comprises a belt about 23 miles long and 3 miles wide.
- RI 4587. Investigation of the Coggins Chromite Mine, Siskiyou County, Calif., by John R. Shattuck and Spangler Ricker. 1949. 9 pp., 2 figs. In 1943 and 1944 Bureau diamond-drilled 15 holes, totaling 988 feet, proving an extension of the ore lens under exploitation.
- RI 4588. Investigation of the Mueller Kaolin Deposit, Jeff Davis County, Tex., by W. D. McMillan, Kenneth G. Skinner, M. P. Hayden, and L. Ray Trotter. 1949. 33 pp., 10 figs. In 1947 Bureau investigated the Mueller kaolin deposit, Tex. Work included a topographic survey of the deposit, sampling of trenches and underground workings, 679.2 feet of drilling, and analysis and testing of samples.
- RI 4589. Investigation of the Fairview Hill Area Manganese Deposits, Leadville, Lake County, Colo., by Norman E. Ebbley, Jr., and John I. Schumacher. 1949. 18 pp., 4 figs. To determine as closely as possible the manganese reserves remaining in this part of the Leadville district and to encourage production, Bureau conducted churn- and diamond-drilling operations in 1945 and 1946.
- RI 4590. Investigation of Tungsten Deposits at Cupric Mine Property, Beaver County, Utah, by William H. King and Stephen R. Wilson. 1949. 9 pp., 4 figs. Previous work on the property consisted of a series of surface trenches and pits. In 1942 and 1943 Bureau drove an adit from west to east for 282 feet and 4 laterals aggregating 100 feet.
- RI 4591. Lead Smelting in the Ore Hearth. III. Zonal Action in the Smelting Column, by G. L. Oldright. 1950. 43 pp., 8 figs. Third of a series on lead smelting. Describes chemical reactions that occur in the smelting columns of commercial-size ore hearths during treatment of lead-sulfide ores. Work done in cooperation with Eagle-Picher Mining & Smelting Co. (See also RI 4562 and 4563.)
- RI 4592. Investigation of Christy Titanium Deposit, Hot Spring County, Ark., by Donald F. Reed. 1949. 10 pp., 20 figs. In 1948 Bureau explored the Christy titanium deposit. Twenty-one holes, totaling 1,536.9 feet, were drilled.
- RI 4593. Investigation of Magnet Cove Rutile Deposit, Hot Spring County, Ark., by Donald F. Reed. 1949. 9 pp., 30 figs. In 1948 Bureau investigated a deposit of rutile—one of the minerals of titanium—in the Magnet Cove area of Hot Spring County to determine extent of the ore body toward the south and west and at depth and to obtain representative samples for metallurgical tests. Twenty-seven holes were drilled.
- RI 4594. Petroleum-Engineering Study of the New Hope Oil Field, Franklin County, Tex., by Charles B. Carpenter, Kenneth F. Anderson, and Alton B. Cook. 1949. 88 pp., 39 figs. Describes how water was pumped underground to maintain reservoir pressure and double the yield of the New Hope oil field, discovered in 1943, and how other problems peculiar to deep-lying reservoir operations were solved.
- RI 4595. Investigation of the Shady Valley Mangane District, Johnson County, Tenn., by Almon F. Robertson and William J. Dempsey. 1949. 9 pp., 18 figs. In 1943 Bureau explored 9 properties in the Shady Valley area and 2 in the Doe Valley area. Drilling in 131 holes totaled 4,398.5 feet, 235 linear feet of bulldozer trenches were cut, and 34.5 feet of test pits were sunk. Results of simulated log-washing and sink-float tests on the ore also are given.
- RI 4596. Washability Study of Coal From a Strip Pit Bed on the Cumberland Plateau, Near Chalybeate, Van Buren County, Tenn., by B. W. Gandrud and H. L. Riley. 1949. 10 pp., 11 figs. Describes washing tests to remove impurities from Tennessee coals. Coal samples for the washability study were obtained from two strip pits of the Cumberland Collieries, Inc., near Chalybeate.
- RI 4597. Experimental Diamond Core-Drilling in the Phosphoria Formation in Southeastern Idaho, by Albert E. Long. 1949. 29 pp., 9 figs. Describes improved methods of diamond drilling in phosphate-bearing beds in southeastern Idaho and southwestern Wyoming which have resulted in greater core of sample recovery.
- RI 4598. Investigation of the Oronogo-Webb City-Duenweg Zinc-Lead District Jasper County, Mo., by Otto Ruhl. 1950. 84 pp., 11 figs. In 1943 and 1944 Bureau churn-drilled 210 holes, totaling 45,047 feet, in this lead-zinc district.
- RI 4599. Concentration of Oxide Manganese Ores From the Vicinity of Death Valley National Monument, California, by T. F. Mitchell, R. Havens, J. V. Batty, and B. K. Shibler. 1949. 26 pp. Based on wartime Metals Reserve Company specifications for marketable manganese, only 1 complete sample of 6 from the Death Valley region tested metallurgically proved of acceptable grade without treatment. Tests on the six ores are described.
- RI 4600. Injection Rates and Pressures for Water-Flooding Midcontinent Oil Sands, by Peter Grandone and J. B. Holleyman. 1949. 30 pp., 9 figs. Presents results of a study of the rates and pressures used for injecting water into several sandstone formations in the Midcontinent fields to stimulate the recovery of oil. Describes test procedures used. Work done in cooperation with State of Oklahoma.
- RI 4601. Investigation of the Huber-Rydalech Manganese Deposits, Tooele County, Utah, by Eugene Frey and Stephen R. Wilson. 1949. 7 pp., 9 figs. In 1942 Bureau investigated the Huber-Rydalech manganese deposits in the Erickson mining district. Work included surface trenching, underground drifting, crosscutting, and shaft sinking.
- RI 4602. Investigation of the Columbia Manganese Deposit, Campbell County, Va., by W. Bruce Montgomery. 1949. 7 pp., 5 figs. In 1942 and 1943 Bureau investigated this manganese deposit near Evington, Va. Prospecting and development work included shaft sinking, crosscutting, drifting, trenching, and test-pitting in six separate areas.
- RI 4603. Investigation of the Klondike Fluorspar Deposit, Livingston County, Ky., by A. S. Swanson. 1949. 19 pp., 2 figs. In 1943 Bureau diamond-drilled 6 holes, totaling 3,377 feet, on this property to determine extension of an ore shoot for reserves of fluorspar.

Reports of Investigations

- RI 4604. Investigation of the Allah Cooper Lead-Zinc Mine, Louisa County, Va., by Wesley A. Grosh. 1949. 6 pp., 3 figs. In 1943 Bureau investigated the Allah Cooper lead-zinc mine. One hole 650 feet deep was diamond drilled.
- RI 4605. Investigation of the Rip Van Winkle Lead-Zinc-Silver Mine, Elko County, Nev., by M. Clair Smith and Russell R. Trengove. 1949. 13 pp., 4 figs. Working from the 600- and 700-foot levels of present mine workings, Bureau diamond-drilled 5 holes, totaling 1,084 feet, in 1943. A 250-foot surface trench was cut, and 28 underground samples were collected for analysis.
- RI 4606. Investigation of the Aiken Kaolin District, Aiken County, S. C., by Kenneth M. Smith. 1949. 35 pp., 2 figs. Exploration work in the Aiken kaolin district, S. C., conducted by Bureau in 1942 indicated that 19,514,000 short tons of kaolin, of which approximately 10,000,000 tons would average over 35 percent alumina, lay under from a foot to 100 feet of cover. Survey included drilling 200 holes, aggregating 11,956 feet, in an area covering 11,272 acres.
- RI 4607. Investigation of the Harding Tantalum-Lithium Deposits, Taos County, N. Mex., by M. Howard Berliner. 1949. 7 pp., 3 figs. In 1943 the main part of a large tantalum-bearing zone in the Harding pegmatite dike was developed by diamond drilling by Bureau. In 1948 Bureau drilled seven additional holes with a view to extending the zone or delimiting the ore body.
- RI 4608. Investigation of the Magnesite Deposit of the Ala-Mar Magnesium Co., Inc., and Nevada Magnesite Co., White Pine County, Nev., by G. H. Holmes, Jr., and E. J. Matson. 1950. 13 pp., 16 figs. In 1942 Bureau dug 54 trenches, diamond-drilled 9 holes, totaling 2,206 feet, and took numerous trench and drill-hole samples from this magnesite deposit.
- RI 4609. Investigation of the Hogan Tin Mine, Kern County, Calif., by Robert H. Bedford and Spangler Ricker. 1949. 10 pp., 2 figs. In 1944 Bureau investigated this mine by trenching and diamond-drilling 11 holes, totaling 1,000 feet.
- RI 4610. Investigation of the Gideon Sillimanite Deposit, Spartanburg County, S. C., by Harry G. Dosh. 1950. 9 pp., 3 figs. In 1948 Bureau conducted an exploratory diamond-drilling project on Gideon property. Six holes, totaling 681.7 feet, were drilled.
- RI 4611. Segregation of Impurities in Zinc-Aluminum Alloys and Its Influence on Accuracy of Sampling, by H. W. St. Clair and D. D. Blue. 1949. 18 pp., 2 figs. Describes development of methods for obtaining representative samples of zinc-aluminum alloys in which impurities have segregated during solidification.
- RI 4612. Chloride Volatilization and Other Tests on a Gold-Copper Ore, by A. L. Engel and H. J. Heinen. 1949. 8 pp. A series of metallurgical tests conducted by Bureau on a gold-copper ore from Chile showed that highest recoveries of gold and copper could be obtained by a process known as chloride volatilization. Describes methods of preparing and treating the ore, results of amalgamation tests, use of water and acid leaches, cyanidation tests, and flotation.
- RI 4613. Investigation of the Yellow Pine Zinc-Lead Mine, Clark County, Nev., by R. W. Geehan and W. T. Benson. 1949. 15 pp., 18 figs. As a result of Bureau's drilling program in 1942 and 1944, four small ore sections were discovered in widely separated parts of the Yellow Pine mine. Ninety-nine holes, totaling 10,472 feet, were completed.
- RI 4614. Refining Metals and Alloys by Filtration, by H. W. St. Clair. 1949. 16 pp., 8 figs. Describes results of experimental work dealing with the refining of metals and the purification of alloys by filtration while in the molten state. This publication is based on a translated report on the process used by a German company.
- RI 4615. Preliminary Tests of Gold and Zinc Ores From Buzzard Mine, Placerville, Calif., by A. L. Engel and H. J. Heinen. 1949. 12 pp. Describes methods developed by Bureau for producing primarily good commercial-grade zinc concentrates and, secondarily, iron concentrates from California sulfide ores.
- RI 4616. Dense Medium and Flotation Tests on an Antimony Ore From California, by A. L. Engel. 1949. 6 pp. Describes results of an investigation conducted by Bureau to develop an improved method of treating relatively low-grade antimony ore so as to increase recovery.
- RI 4617. Investigation of the Table Mountain Copper Deposit, Churchill County, Nev., by E. J. Matson. 1949. 6 pp., 7 figs. In 1947 and 1948 Bureau investigated the Table Mountain copper deposit. Thirteen holes, totaling 2,711 linear feet, were drilled, and 509 core samples and 143 sludge samples were collected for analysis.
- †RI 4618. A Method of Test for SO<sub>2</sub> and SO<sub>3</sub> in Flue Gases, by A. A. Berk and L. R. Burdick. 1950. 9 pp., 1 fig. Describes a revised procedure for determining sulfur dioxide and sulfur trioxide in flue gases—one phase of Bureau of Mines research on boiler equipment. In Bureau laboratories test procedure of A. S. M. E. was revised to prevent oxidation of sulfite in the absorption bottle and to allow for the effect of carbon dioxide.
- RI 4619. Investigation of the Seiad Creek Chromite Deposits, Siskiyou County, Calif., by Frank J. Wiebelt and Spangler Ricker. 1949. 28 pp., 10 figs. In 1941 Bureau conducted an exploration and development program which included diamond drilling, drifting and crosscutting, surface trenching and sampling, and 3,110 feet of trail and road.
- RI 4620. Laboratory Concentration of Mercury Ores From Oregon, California, Idaho, and Nevada, by R. R. Wells. 1950. 19 pp. Describes results of laboratory tests on concentration of six samples of mercury ore from Oregon, California, Idaho, and Nevada.
- RI 4621. Titanium and Iron Minerals From Black Sands in Bauxite, by W. A. Calhoun. 1950. 16 pp., 1 fig. Describes methods of recovering valuable titanium and iron minerals from waste products of Arkansas bauxite.
- RI 4622. A Test of Treated Timbers in a Mine at Negaunee, Mich., by F. S. Crawford and R. M. Wirka. 1950. 6 pp., 2 figs. Deals with effectiveness and economy of installing mine timbers treated with preservatives in long-life-service locations. A cooperative test carried on by the Bureau, the Cleveland-Cliffs Iron Co., and the Forest Products Laboratory, Forest Service, United States Department of Agriculture, showed that treated timbers last from 2 to 3½ times as long as untreated ones set in same mine passageway. Test (begun in 1926 and ended in 1945) was made in the company's Athens iron-ore mine at Negaunee.
- RI 4623. Investigation of the Union Zinc-Lead Mine, Washoe County, Nev., by Robert W. Geehan. 1950. 10 pp., 18 figs. In 1947 Bureau conducted a drilling project at Union zinc-lead mine to test for horizontal and vertical extensions of ore body and to prospect for parallel ore bodies. Twenty-one diamond-drill holes, totaling 1,549 feet, and 20 long percussion-drill holes, totaling 359 feet, were drilled.
- RI 4624. Shuttle-Car Tire and Roadbed Study, by R. H. Nicholas, J. S. Whittaker, D. D. Dornenburg, John P. Harmon, and Walter Bank. 1949. 22 pp., 13 figs. Gives results of tests conducted in the Mathies

†Out of print.

- mine, Library, Pa., under a cooperative agreement with Pittsburgh Coal Co. Relative effect of rough-tread and smooth-tread tires on mine roadbed and upon operation of and amount of dust stirred up by shuttle cars was studied, as was the effectiveness of varying amounts of calcium chloride on haulage-ways.
- RI 4625. Development of a Successful Multiple Percussion Drill Carriage, by Homer J. Ballinger. 1950. 6 pp., 4 figs. Describes a multiple drill carriage or "jumbo" which permits simultaneous drilling of four 15-foot holes in tough rock, and which has cut drilling labor costs 75 percent in the year it has been in use at Bureau's experimental oil-shale mine, near Rifle, Colo.
- RI 4626. Investigation of the Tem Plute Tungsten Deposit, Lincoln County, Nev., by E. O. Binyon, G. H. Holmes, Jr., and A. C. Johnson. 1950. 16 pp., 23 figs. In 1942 and 1944 Bureau investigated the Tem Plute tungsten deposit. Fourteen diamond-drill holes, totaling 4,347 feet, were drilled; 138 trenches were excavated; and approximately 4,935 feet of roads and trails were built. Bureau engineers took 659 samples from the trenches and 2 short adits.
- RI 4627. Investigation of the Atolia Tungsten Mines, San Bernardino County, Calif., by Frank J. Wiebelt and Spangler Ricker. 1950. 25 pp., 2 figs. In 1943 and 1944 Bureau investigated the Atolia tungsten mines. Twelve holes, totaling 5,056 feet, were diamond drilled.
- RI 4628. Effects of Core Recovery, Diamond Size, and Quality on Cost of Core Drilling in Gneiss, by Albert E. Long. 1950. 11 pp., 4 figs. First in series covering effects of diamond size and quality on cost of core drilling in different rocks. Summarizes data on diamond loss and bit costs incurred during 10 different Bureau projects involving 6,097 feet of drilling in gneiss in New York, Pennsylvania, and New Jersey.
- RI 4629. Investigation of the Romur Tungsten Deposits, Fremont County, Wyo., by Eugene Frey and Stephen R. Wilson. 1950. 9 pp., 8 figs. In 1942 Bureau investigated the Romur tungsten deposits by driving an adit on the Comet claim and by taking samples from this property and from surface and underground exposures on adjoining properties.
- RI 4630. Investigation of the Clinton Jackson Quartz Crystal Deposits, Carroll County, Va., by James E. Bell and Robert C. Hickman. 1950. 3 pp., 2 figs. In 1943 Bureau investigated the Clinton Jackson quartz crystal deposits. Sixty-one test pits were dug.
- RI 4631. Investigation of Cherry Creek Tungsten District, White Pine County, Nev., by George H. Holmes, Jr. 1950. 7 pp., 14 figs. Bureau investigated Cherry Creek tungsten district in 1942. Work comprised rehabilitation of mine workings, surveying, and road building, followed by development of the mineralized zone. Sixteen diamond-drill holes, totaling 2,515 feet, were drilled at Cherry Creek tungsten mine and on Chance claim, and 54 trenches, totaling 2,897 linear feet, were dug.
- RI 4632. Investigation of the Beecher No. 2 Lithium-Bearing Pegmatite, Custer County, S. Dak., by John Paul Gries. 1950. 14 pp., 2 figs. In 1943 and 1944 Bureau explored the Custer County property by taking a series of trench samples for grain-count studies and chemical analyses.
- RI 4633. Investigation of the Zebulon or Privett Manganese Deposit, Wake County, N. C., by Thomas W. Thompson. 1950. 16 pp., 3 figs. Following preliminary examination in 1941 Bureau explored the Wake County deposit by diamond-drilling 14 holes, totaling 2,308.5 feet, in 1944 and 1945.
- RI 4634. Investigation of Nevada-Massachusetts Tungsten Deposits, Pershing County, Nev., by William H. King and George H. Holmes, Jr. 1950. 6 pp., 11 figs. A Bureau of Mines development program was conducted in 1941 in the Mill City mining district in Nevada. Bureau drilled 14 diamond-drill holes, totaling 5,255 feet; excavated 63 trenches, aggregating 1,399 feet; and collected 390 samples for analysis.
- RI 4635. A Manometric Precision Procedure for Determining the Vapor Pressure of Aviation Gasolines, by W. C. Holliman and M. G. Barker. 1950. 16 pp., 5 figs. Describes apparatus and procedure used for determining vapor pressure of aviation gasoline in surveys of commercial aviation-gasoline characteristics made by Bureau in cooperation with Coordinating Fuel and Equipment Research Committee of Coordinating Research Council, Inc. Method is modification of Reid method, in which a mercury manometer is substituted for Bourdon-type gage of Reid method.
- RI 4636. Pressure-Relieving Capacities of Diaphragms and Other Devices for Venting Dust Explosions, by John Nagy, J. E. Zellinger, and Irving Hartmann. 1950. 15 pp., 7 figs. Describes recent experiments that were made to determine relative effectiveness of an unrestricted vent and 22 types of closures, including various paper, cloth, and metal-foil diaphragms, hinged doors or panels, and several kinds of scored and unscored glass panes, in relieving pressures produced by dust explosions to reduce structural damage.
- RI 4637. A Study of Stray Currents in Pennsylvania Anthracite Mines, by Charles F. Weber. 1950. 8 pp., 3 figs. Death and injury toll from premature discharge of explosives in anthracite mines can be cut sharply by taking relatively simple electrical precautions. Gives results of electrical surveys made by Bureau in representative anthracite collieries.
- †RI 4638. Proposed Process for Treatment of Low-Grade Titaniferous Ores. Laboratory Tests on Sintering With Carbon and Soda Ash to Produce Metallic Iron and Soluble Titanates, by Robert T. MacMillan, Joseph I. Dinnin, and John E. Conley. 1950. 19 pp., 3 figs. Describes laboratory studies made by Bureau on proposed process for treating low-grade titanium-bearing iron ores.
- RI 4639. Effect of Temperature on Flame-Arresting Properties of Flat Joints in Explosion-Proof Mine Equipment, by R. S. James. 1950. 27 pp., 5 figs. Describes study conducted by Bureau to determine effect of high temperatures on flame-arresting properties of protective plates used on underground mining equipment.
- RI 4640. Investigation of the West Tintic Tungsten Deposit, Juab County, Utah, by Stephen R. Wilson. 1950. 14 pp., 5 figs. Following preliminary examination by Bureau engineer in 1941, the West Tintic tungsten deposit was investigated by Bureau in 1942 and 1943. Eleven diamond-drill holes, totaling 1,480 feet, were drilled; 20 trenches, totaling 350 linear feet, were dug; and 61 ore samples from drill holes and surface trenches were assayed.
- RI 4641. Investigation of the Rutherford Pegmatite Mine, Amelia County, Va., by Robert C. Hickman. 1950. 6 pp., 2 figs. In 1943 Bureau diamond-drilled 5 holes, totaling 1,250 feet, on Rutherford pegmatite—a deposit containing mica, quartz, feldspar, and other minerals.
- RI 4642. Investigation of the Vicksburg Lead-Zinc Mine, Beaver County, Utah, by James W. Townsend. 1950. 18 pp., 14 figs. In 1948 Bureau diamond-drilled 7 holes, aggregating 2,555.5 feet, in Vicksburg mine to determine whether there is ore below the known mineralized zone.
- RI 4643. Shuttle-Car Conversion From Storage-Battery to Diesel-Electric Power, Acme Mine, Certain-teed Products Corp., Acme, Hardeman County, Tex., by D. H. Platt. 1950. 16 pp., 4 figs. Describes

†Out of print.

Reports of Investigations

- how conversion of one shuttle car from storage-battery to diesel-electric power brought speedier and more economical haulage to Acme gypsum mine.
- RI 4644. National Motor-Gasoline Survey, Summer 1949, by O. C. Blade. 1949. 32 pp., 3 figs. Octane numbers of regular- and premium-price gasolines bought by American motorists during summer of 1949 were 1 to 2 points higher than during the 2 previous summers, according to this survey. Based on tests of gasolines collected during July and August from 200 cities in 17 marketing areas of the United States, this survey included 2,911 samples obtained of service stations of about 115 major and minor companies. Work done in cooperation with American Petroleum Institute.
- RI 4645. Investigation of the Brown-Tipton Zinc Deposit, Greene County, Tenn., by A. H. Warner. 1950. 6 pp., 3 figs. Seven trenches dug on the Brown farm, under supervision of Bureau engineers in 1944, exposed the bed most favorable for zinc deposition. Includes descriptions of the deposit and the ore.
- RI 4646. Investigation of the Fluorite Deposits of the Dike and Eaton Veins, Crittenden County, Ky., by Xavier B. Starnes. 1950. 21 pp., 4 figs. Bureau drilled 12 holes, totaling 2,869.8 feet, on 4 properties in Crittenden County by core drilling in 1944.
- †RI 4647. Bureau of Mines Strategic Minerals Development Program. Summary of Progress, 1939-49, by Lowell B. Moon. 1950. 62 pp. More than 10,000 investigations of domestic deposits of 33 different minerals have been made by Bureau during past 10 years under a broad strategic minerals development program which charted and developed new reserves for war and peacetime use, according to this publication summarizing the program. About 1,300 projects in 48 States and Alaska, costing more than \$29,000,000, were completed. Includes appendix listing publications on investigations completed during 10-year period.
- RI 4648. Investigation of Tungsten Metals Corp. Deposits (Minerva Mining District), White Pine County, Nev., by E. W. Newman, Robert W. Geehan, and Russell R. Trengove. 1950. 12 pp., 11 figs. Bureau, in cooperation with Federal Geological Survey, by surface trenching and diamond drilling in 1940, 1941, and 1943, developed additional tungsten reserves. Includes diamond-drill-hole data.
- RI 4649. Laboratory Tests on Percolation Leaching of Silica From Bauxites, by Milford L. Skow and John E. Conley. 1950. 16 pp. For desilicating lower grade bauxites before the Bayer treatment, method was developed in Germany in which bauxite was calcined and then given a dilute caustic leach preliminary to the pressure digestion. As European bauxites are mineralogically different from those found in this country, preliminary work was undertaken to determine whether this process might be applied to domestic materials. Results of this work, with a review of the German process, are presented.
- RI 4650. Investigation of the Rose Run Iron Area, Bath County, Ky., by Neal M. Muir. 1950. 43 pp., 5 figs. In 1944 Bureau investigated the Rose Run area by drilling 74 churn-drill holes, totaling 2,059.4 feet, and 4 cuts and test pits.
- RI 4651. Synthetic Liquid Fuels. Annual Report of the Secretary of the Interior for 1949. Part I. Oil From Coal. 1950. 62 pp., 81 figs. Deals primarily with progress made for producing synthetic liquid fuels from coal. Includes bibliography.
- RI 4652. Synthetic Liquid Fuels. Annual Report of the Secretary of the Interior for 1949. Part II. Oil From Oil Shale. 1950. 70 pp., 78 figs. Deals primarily with progress made in producing synthetic liquid fuels from oil shale. Includes bibliography.
- RI 4653. Synthetic Liquid Fuels. Annual Report of the Secretary of the Interior for 1949. Part III. Liquid Fuels From Agricultural Residues. 1950. 13 pp., 9 figs. Gives results of progress made for producing synthetic liquid fuels from agricultural wastes.
- RI 4654. Synthetic Liquid Fuels. Annual Report of the Secretary of the Interior for 1949. Part IV. Oil From Secondary Recovery and Refining. 1950. 26 pp., 10 figs. Gives results of research on secondary-recovery methods as applied to stripper oil fields and on refining processes.
- RI 4655. Oil Shale in Brazil, by A. J. Kraemer. 1950. 36 pp., 8 figs. Oil shales and other rocks from which oil can be retorted have been found in 10 Brazilian States, but chief development work has been done in Tremembé-Taubaté area deposits, which are in Paraíba River Valley in State of São Paulo. Includes logs of drill holes on mining concessions and descriptions of mining work at Tremembé and retorting and refining operations at Taubaté.
- †RI 4656. Deep-Well Pumps and Shaft Pumps in Anthracite Mines of Pennsylvania, by William H. Lesser. 1950. 52 pp., 4 figs. Describes deep-well and shaft pumps in anthracite area and presents performance records of deep-well pumping installations at 13 different collieries.
- †RI 4657. Analyses of Some Crude Oils From the Middle East, South America, and Canada, by O. C. Blade, E. L. Garton, and C. M. McKinney. 1950. 45 pp. Gives results of analyses of 35 samples of crude oil from fields in the Middle East, South America, and Canada. Includes a table showing fields by country, year of discovery, and production for 1948; other tables present a breakdown of general characteristics of the oil samples and a list, as well as a bibliography, for all analyses of foreign crude oils published by Bureau.
- RI 4658. A Preliminary Survey of Zirconium Alloys, by C. T. Anderson, E. T. Hayes, A. H. Roberson, and W. J. Kroll. 1950. 48 pp. Presents results of an investigation of zirconium alloys begun in 1947, in cooperation with Air Matériel Command, United States Air Force. Describes preliminary study of about 25 zirconium-rich alloy systems with regard to preparation, fabrication, tensile properties, metallographic structures, constitution, and heat resistance.
- RI 4659. Investigation of Stange and Byrnes Heirs Manganese Mines, Bland and Giles Counties, Va., by Lowell B. Moon. 1950. 82 pp., 10 figs. In 1941 Bureau investigated the Stange and Byrnes Heirs manganese mines. Thirty-three churn-drill holes, totaling 1,978 feet, were drilled; 17 trenches, aggregating 4,500 feet, were dug by bulldozing; and 132 channel samples were taken from the faces of the pit.
- RI 4660. Investigation of Gilley Fluorspar Deposits, Cherokee County, Ala., by James F. O'Neill. 1950. 6 pp., 3 figs. To determine extent and grade of Gilley fluorspar deposit, Bureau dewatered and cleaned out the existing mine workings, excavated 243 feet of new trenches to bedrock, and analyzed 11 samples.
- RI 4661. Investigation of the Winterboro Talc Deposits, Talladega County, Ala., by Avery H. Reed, Jr. 1950. 7 pp., 9 figs. In 1948 and 1949 Bureau investigated the Winterboro talc deposits by drilling 75 holes, totaling 3,370.4 feet. Twenty-seven samples were taken for assay.
- RI 4662. Solvent Extraction of Coal by Aromatic Compounds at Atmospheric Pressure, by C. Golumbic, J. B. Anderson, M. Orchin, and H. H. Storch. 1950. 12 pp., 3 figs. Presents results and discusses experiments of solvent extraction of coal by aromatic compounds at atmospheric pressure; discusses chemical, physical, and coking properties of phenanthrene (used as solvent in extraction of bituminous coal) extracts.

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- RI 4663. Comparison of Poisonous Gases From Permissible Explosives as Obtained in Bichel-Gage and Coal-Mine Tests, by J. E. Tiffany, E. J. Murphy, and N. E. Hanna. 1950. 12 pp., 10 figs. Firing permissible explosives under actual coal-mining conditions generates certain poisonous gases—particularly carbon monoxide—in the same ratios obtained in laboratory tests, undertaken to determine accuracy of Bichel-gage tests as part of a program to reevaluate laboratory testing procedures, made at Bureau's Experimental mine at Bruceton, Pa. Discusses materials used and procedure followed, gives results obtained, and includes tables of analyses of gaseous products both from test blasting shots and Bichel-gage tests.
- RI 4664. National Annual Survey of Commercial Aviation Gasoline, October 1949 Production, by O. C. Blade. 1950. 14 pp., 4 figs. Describes survey of aviation fuels. Based on test data furnished by 16 manufacturers of aviation gasoline, survey includes 58 samples of commercial aviation gasoline. In addition, data on 11 samples of aviation fuel designated for military use only are given but are not included in the averages. Work done in cooperation with Coordinating Fuel and Equipment Research Committee of Coordinating Research Council, Inc.
- RI 4665. Magruder and Chambers Copper Deposits, Lincoln and Wilkes Counties, Ga., by Alexander L. Peyton and Harland E. Cofer, Jr. 1950. 23 pp., 11 figs. In 1948 and 1949 Bureau diamond-drilled 10 holes, totaling 3,784 feet, at Magruder and Chambers copper deposits. Eighty-eight core samples analyzed.
- RI 4666. Investigation of Perkiomen Creek Copper Deposits, Montgomery County, Pa., by Kenneth M. Earl. 1950. 13 pp., 3 figs. Bureau investigated Perkiomen Creek copper deposits by diamond-drilling 5 holes, aggregating 2,216 feet, in 1948.
- †RI 4667. Report of Research and Technologic Work of Explosives, Explosions, and Flames, Fiscal Year 1949, by Bernard Lewis. 1950. 68 pp., 32 figs. Summarizes fundamental research and technical studies conducted by Explosives Branch for the 12 months ended June 30, 1949. Report covers explosives research, chemical and physical tests on explosives, flame and combustion research, flammability of gases and vapors, experimental coal-mine and dust explosions, work for other agencies, and demonstrations of mine fires and explosions.
- RI 4668. Investigation of Oriskany Iron-Ore Deposits, Alleghany, Bath, Botetourt, and Craig Counties, Va., by G. A. Morrison and W. A. Grosh. 1950. 59 pp., 7 figs. Bureau investigated the Oriskany iron-ore deposits in 1943 and 1944. One hundred sixty-three holes, totaling 11,851 feet, were drilled; 236 feet of prospect tunnels were driven; 1,346 samples were collected; beneficiation tests were performed and bulldozer trails and trenches were excavated.
- RI 4669. Investigation of Taylor Creek Lead-Zinc Deposit, Kupreanof Island, Petersburg, Alaska, by W. H. Kerns. 1950. 13 pp., 6 figs. Bureau diamond-drilled 4 holes, totaling 770.5 feet, and hand-trenched 280 feet on a small creek on east side of Kupreanof Island in 1948 to determine extent of Taylor Creek lead-zinc deposit.
- RI 4670. Flotation and Cyanidation Tests on a Gold-Copper Sulfide Ore From Cooke, Mont., by A. L. Engel and H. J. Heinen. 1950. 9 pp. Describes flotation and cyanidation tests made on a typical low-grade ore of gold, silver, and copper containing copper sulfide minerals.
- RI 4671. Limits of Flammability and Ignition Temperatures of Phthalic Anhydride, by G. W. Jones and M. G. Zabetakis. 1950. 7 pp. Gives results of an investigation on limits of flammability and ignition temperatures of phthalic anhydride—an important chemical in the production of anthraquinone, alkyl resins, plasticizers, and other chemicals—and of crude naphthalene, its chief raw material, conducted by Bureau because many fires and explosions have occurred during the manufacture of phthalic anhydride.
- †RI 4672. A Process for the Recovery of Gold From Activated Carbon by Leaching and Electrolysis, by J. B. Zadra. 1950. 47 pp., 7 figs. Deals with a process for extracting gold from gold-laden carbon and reuse of the adsorbed carbon.
- RI 4673. Investigation of North Empire Zinc-Lead Deposit, Cherokee County, Kans., by Louis C. Brichta. 1950. 48 pp., 2 figs. In 1948 Bureau churn-drilled 39 holes for an aggregate of 6,433.5 feet of bore with the object of developing reserves which might be exploited at low cost by open-pit mining.
- RI 4674. Flotation of a North Carolina Pyrophyllite Ore, by Frank D. Lamb and John Ruppert. 1950. 7 pp. Describes procedure followed and results obtained by laboratory flotation of pyrophyllite from quartz in a North Carolina ore.
- RI 4675. Investigation of Shawangunk Mine Zinc-Lead Deposit, Near Summitville, Sullivan County, N. Y., by N. A. Eilertsen. 1950. 41 pp., 14 figs. In 1948 and 1949 Bureau investigated the Shawangunk mine by diamond-drilling, sampling, and performing beneficiation tests. Twenty-four holes, totaling 6,526 feet, were drilled, and 151 samples were taken.
- RI 4676. Hydrogenation of Petroleum and Lignite Tar Distillates, by E. A. Clarke, C. C. Chaffee, and L. L. Hirst. 1950. 27 pp., 21 figs. Outlines process and summarizes operating experience gained and characteristics of products made during operation of Coal-Hydrogenation Demonstration Plant at Louisiana, Mo., on two feed stocks.
- RI 4677. Investigation of Fluorite Deposits of Babb Vein System, Crittenden and Livingston Counties, Ky., by A. S. Swanson and X. B. Starnes. 1950. 30 pp., 5 figs. Describes a diamond-drilling investigation of fluorite deposits in Crittenden and Livingston Counties conducted by Bureau in 1943 and 1944. Twenty-eight holes, totaling 8,177.8 feet, were diamond drilled.
- RI 4678. Investigation of Nightingale Tungsten Deposit, Pershing County, Nev., by J. H. East, Jr., and Russell R. Trengove. 1950. 8 pp., 8 figs. Searching for new reserves of tungsten ore, Bureau investigated the Nightingale tungsten deposit in 1939 and 1940 by excavating 15 trenches and diamond-drilling 9 holes, totaling 3,000 feet. Contains maps and drill-hole information.
- RI 4679. Investigation of the Great Eastern Nickel Deposit, Clark County, Nev., by A. B. Needham, John H. Soule, and Russell R. Trengove. 1950. 5 pp., 8 figs. To determine the zone of mineralization, Bureau, from 1939 to 1941, completed 590 feet of drifting and crosscutting underground and 1,901 feet of diamond drilling, taking 401 samples, on the Great Eastern property.
- RI 4680. Investigation of Eagle Silver Lead-Zinc Mine, Tooele County, Utah, by W. A. Young. 1950. 11 pp., 4 figs. In 1947 and 1948 Bureau investigated the Eagle Silver mine by diamond drilling. Nine holes, aggregating 852.8 feet, were drilled.
- RI 4681. Investigation of Nevada Scheelite, Inc., Deposit, Mineral County, Nev., by Robert W. Geehan and Russell R. Trengove. 1950. 13 pp., 11 figs. In 1943 and 1944 Bureau developed the property of Nevada Scheelite, Inc., by core drilling to determine possible reserves in the lateral and vertical extensions of a tectite zone which was being mined for scheelite. Eleven diamond-drill holes, totaling 2,365 feet, were drilled.

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## Reports of Investigations

- RI 4682. Investigation of Guadalupe Mercury Mine, Santa Clara County, Calif., by Robert H. Bedford and Spangler Ricker. 1950. 9 pp., 8 figs. In 1942 and 1943 Bureau investigated the Guadalupe mercury mine by sampling old dumps, rehabilitating 1½ miles of road, surface trenching, and diamond-drilling 7 holes, totaling 1,000 feet.
- RI 4683. Generation and Propagation of Strain Waves in Rock. Part 1, by Leonard Obert and Wilbur I. Duvall. 1950. 19 pp., 20 figs. Deals with generation and propagation of strain waves produced in rock by detonation of a high-velocity explosive. Work done in cooperation with Protective Construction Branch, USEED, Department of the Army.
- RI 4684. Coal-Mining Methods and Practices and Electric Power Requirements in the Bull Mountain Coal Field, Montana, by Raymond G. Travis and Louis A. Turnbull. 1950. 27 pp., 6 figs. Describes coal-mining methods, power requirements, coal production and distribution, and coal resources of Bull Mountain coal field in Musselshell and Yellowstone Counties, Mont.
- RI 4685. Tests on the Control of Coal-Mine Fires in the Experimental Coal Mine, by John Nagy, Irving Hartmann, and H. C. Howarth. 1950. 14 pp., 5 figs. Gives results of tests conducted in Experimental coal mine at Bruceton, Pa., to study some of factors that should be considered in fighting mine fires and to obtain data on effectiveness of different types of extinguishing agents.
- RI 4686. Experiments on Safety of Incombustible Plugs for Stemming Explosives, by Irving Hartmann, H. C. Howarth, and John Nagy. 1950. 13 pp., 4 figs. Describes experiments to determine safety of an incombustible stemming plug for use in coal-mine blasting.
- RI 4687. Analysis of Crude Oils From Some Fields of Southeastern United States, by O. C. Blade and E. L. Garton. 1950. 36 pp. Gives analyses of 51 samples of crude petroleum from Alabama, Florida, Kentucky, Mississippi, Tennessee, and Virginia. Includes a list and bibliography of analyses of crude oils from this region dating back to 1921.
- RI 4688. Recent Rock-Dusting Experiments for Arresting Coal-Mine Explosions, by Irving Hartmann, John Nagy, H. C. Howarth, and Abner Sachs. 1950. 16 pp., 7 figs. Describes an investigation in Experimental coal mine at Bruceton, Pa., to determine efficacy and safety of dispersing rock dust by explosives and to ascertain whether explosive gas-air mixtures or coal dust might be ignited during such rock dusting; describes some recent experiments on bag-type devices in which each unit was provided with a burster for scattering rock dust in path of explosion.
- RI 4689. Investigation of the Sunrise Copper-Gold Mine, Granite County, Mont., by John W. Cole. 1950. 13 pp., 5 figs. Describes investigation undertaken by Bureau in 1948 to develop new mineralized veins at Sunrise copper-gold mine.
- RI 4690. Secondary Recovery of Oil by Air and Gas Injection in the Brenneman Field, Hancock County, W. Va., by E. M. Tignor, Wm. M. Nabors, Thomas Jennings, and Leon Krause. 1950. 26 pp., 11 figs. Discusses secondary-recovery operations of oil by air and gas injection in Brenneman field, including, original development and geology of field, oil production, and reservoir analysis.
- RI 4691. Investigation of the Tapley Copper Deposit, Hancock County, Maine, by Kenneth M. Earl. 1950. 7 pp., 2 figs. Describes a diamond-drilling study of the Tapley copper deposit made by Bureau in 1948 as part of its program for increasing domestic reserves of strategic minerals. Five holes, aggregating 1,204 feet, were diamond drilled.
- RI 4692. Vibrations Associated With a Spherical Cavity in an Elastic Medium, by Wilbur I. Duvall and Thomas C. Atchison. 1950. 9 pp., 5 figs. As part of research on fundamental physics of breaking rock by explosives carried on for several years by Bureau, a theoretical study of the problem of forced vibration of a spherical cavity in an elastic medium is presented.
- RI 4693. Investigation of Mica Deposits at the White Bear, Silver Dollar, Buster Dike, and Hot Shot Mines, Custer County, S. Dak., by A. B. Needham. 1950. 54 pp., 11 figs. In 1947 Bureau investigated the mica deposits at White Bear, Silver Dollar, Buster Dike, and Hot Shot mines. Eleven diamond-drill holes, totaling 2,114 feet, were completed on the 4 properties.
- RI 4694. Investigation of the Cove Meadow Copper Deposit, Humboldt County, Nev., by Russell R. Trenslove. 1950. 6 pp., 5 figs. In 1949 Bureau developed the Cove Meadow copper property by core drilling. Development work included a study of the geology, mapping the area, sampling the outcrops, and diamond-drilling 7 holes, totaling 1,246 feet.
- RI 4695. Carbon Blacks Formed by Decomposition of Mixtures of Acetylene With a Hydrocarbon or Other Gas at Elevated Pressures, by G. W. Jones, R. E. Kennedy, I. Spolan, and G. S. Scott. 1950. 9 pp., 6 figs. Describes an experimental process in which high-quality carbon black, used chiefly in rubber making, can be made by decomposing acetylene mixed with one of several other gases under pressure.
- RI 4696. Investigation of Smuggler Lead-Zinc Mine, Aspen, Pitkin County, Colo., by M. E. Volin and J. H. Hild. 1950. 47 pp., 11 figs. In 1943 and 1946 Bureau conducted preliminary examinations of Smuggler lead-zinc mine and in 1946, 1947, and 1948 conducted sampling and drilling operations.
- RI 4697. Investigation of the New Almaden Mercury Mine, Santa Clara County, Calif., by Robert H. Bedford and Spangler Ricker. 1950. 29 pp., 2 figs. In 1943, following preliminary investigations by Bureau and Federal Geological Survey, Bureau explored the area by diamond-drilling 36 holes, totaling 6,807 feet.
- RI 4698. Petroleum-Engineering Study of the Carthage Gas Field, Panola County, Tex., by C. J. Wilhelm, H. M. Harris, and M. N. Harlin. 1950. 60 pp., 35 figs. Considered the fourth largest natural-gas reserve in United States, the Carthage field was developed rapidly during the war, increasing from 19 producing wells in 1944 to 306 producing wells in 1948. Survey includes descriptions of the geology of the field and producing reservoirs, drilling and development of the field, gathering systems and pipeline outlets, natural-gasoline plants, and estimates of gas reserves.
- RI 4699. Organic Sulfur in Synthesis Gas: Occurrence, Determination, and Removal, by A. E. Sands, H. W. Wainwright, and G. C. Egleson. 1950. 51 pp., 19 figs. Describes progress made in the search for effective, low-cost ways of removing sulfur impurities from synthesis gas and deals with a portion of the research and development work in synthesis-gas purification carried out at Bureau's Morgantown, W. Va., station in cooperation with West Virginia University.
- RI 4700. Data on Pumping at the Anthracite Mines of Pennsylvania, by S. H. Ash, W. L. Eaton, Joseph C. Gilbert, H. M. James, Hayden E. Jenkins, D. O. Kennedy, H. D. Kynor, Howard B. Link, and W. M. Romischer. 1950. 264 pp., 31 figs. Reviews briefly the threat to Nation's reserves of Pennsylvania anthracite from the flow of water into the workings; presents data on pumping at individual collieries and at central stations; describes various types of

- pumps used for unwatering the mines; and includes photographs and charts of typical mine pumping-plant installations.
- RI 4701. Investigation of the Douglas Copper Deposit, Hancock County, Maine, by Kenneth M. Earl. 1950. 17 pp., 2 figs. In 1948 Bureau investigated Douglas copper deposit by diamond-drilling 7 holes, totaling 2,117.4 feet.
- RI 4702. National Motor-Gasoline Survey, Winter 1949-50, by O. C. Blade. 1950. 32 pp., 3 figs. Based on tests of gasolines collected during December 1949 and January and February 1950 from 216 cities in 17 marketing areas of the United States, survey includes 3,695 samples obtained from service stations of 135 small and large petroleum suppliers. Work done in cooperation with American Petroleum Institute.
- †RI 4703. Investigation of New Galena Lead Deposit, Bucks County, Pa., by Kenneth M. Earl. 1950. 7 pp., 2 figs. In 1948 Bureau investigated New Galena lead deposit by diamond-drilling 2 holes, totaling 373.9 feet.
- RI 4704. Investigation of the Coosa Tin Deposits, Coosa County, Ala., by Avery H. Reed, Jr. 1950. 33 pp., 17 figs. In 1948 and 1949 Bureau investigated the Coosa tin deposits by hand and machine trenching, shaft sinking and drifting, and diamond-drilling 31 holes, totaling 2,776 feet.
- †RI 4705. A Circuit for Firing Seismic Blasting Caps, by Wilbur I. Duvall. 1950. 2 pp., 2 figs. Describes an improved electrical blasting circuit permitting more accurate recording of rock vibrations.
- RI 4706. Investigation of the Lake Shore Copper Deposits, Pinal County, Ariz., by T. M. Romslo. 1950. 24 pp., 7 figs. In 1948 and 1949 Bureau investigated the Lake Shore property by topographic and geologic mapping, exploratory drilling, and metallurgical test work. One diamond-drill hole and 5 churn-drill holes, totaling 2,872.5 feet, were completed.
- RI 4707. Recent Developments in Combination Cleaning and Dewatering of Fine Sizes of Coal, by B. W. Gandrud and H. L. Riley. 1950. 28 pp., 11 figs. In 1947 joint research by Bureau and private industry produced a kerosine-flotation process capable of cleaning and dewatering smaller sizes of coal in a combined operation. To test practicability of the process on commercial scale, the Sloss Sheffield Steel & Iron Co. constructed two plants, one at its Bessie mine to treat dewatering screen sludge and the other at its Kimberly mine to treat raw-coal fines. Detailed descriptions of the operating procedures employed at both plants are given.
- RI 4708. Waxes From Shale-Oil Wax Distillate, by P. R. Tisot and Joseph W. Horne. 1950. 21 pp., 4 figs. Describes methods used in extracting, refining, analyzing, and testing waxes from shale-oil distillates and lists physical properties of the waxes.
- RI 4709. Development of a Mobile Compressor and Utility Station, by Fred D. Wright and Homer J. Ballinger. 1950. 4 pp., 4 figs. Describes a mobile compressor and utility station, designed and built by Bureau engineers, and gives a record of its performance in Bureau's oil-shale mine near Rifle, Colo.
- RI 4710. Rate of Evaporation of Zinc at Low Pressures, by H. W. St. Clair and M. J. Spendlove. 1950. 13 pp., 13 figs. This study, undertaken as a part of a general investigation on refining mixtures of metals resulting from melting reclaimed scrap, was to determine accurately the effect of temperature, pressure, and other factors on the rate of evaporation of zinc.
- †RI 4711. Improvements in Methods for Preparing Thin Sections of Rock, by Harold L. Gibbs and LaMar G. Evans. 1950. 6 pp., 3 figs. Gives detailed instructions, based on methods developed at Bureau's Salt Lake City laboratory, for preparing thin sections of rock because of a growing demand in mining and metallurgical fields for microscopic examination of rocks, ores, and metallurgical products.
- †RI 4712. Investigation of the Fannie Ryan and Boulder City Manganese Deposits, Clark County, Nev., by William H. King and Russell B. Trengove. 1950. 8 pp., 5 figs. In 1941 Bureau investigated the Fannie Ryan and Boulder City manganese deposits. Seven holes, totaling 1,462 feet, were diamond drilled at Fannie Ryan deposit, and 188 feet of drilling was done in 2 holes at Boulder City deposit.
- RI 4713. Investigation of Black Diablo, Black Eagle, and Black Rock Manganese Deposits, Pershing and Lander Counties, Nev., by A. B. Needham and Russell R. Trengove. 1950. 17 pp., 20 figs. In 1940 Bureau began investigation of Black Diablo, Black Eagle, and Black Rock manganese deposits. Twenty-six holes were drilled, totaling 2,879 feet, and 5,012 linear feet of trenches were excavated and sampled.
- †RI 4714. Use of Explosives in Oil and Gas Wells—1949 Test Results, by Bruce F. Grant, Wilbur I. Duvall, Leonard Obert, R. L. Rough, and T. C. Atchison. 1950. 29 pp., 22 figs. Discusses research by Bureau to determine the most effective uses of explosives in shooting oil and gas wells, as measured in terms of rates of production from the wells.
- RI 4715. Helium Tracer-Gas Studies in the Cabin Creek, W. Va., Oil and Gas Field, by E. M. Frost, Jr. 1950. 28 pp., 35 figs. Gives results of helium tracer-gas tests conducted jointly by Bureau and The Pure Oil Co. in the Cabin Creek field, Boone and Kanawha Counties, W. Va.
- RI 4716. Effect of Oil-Base Drilling Fluid Filtrate on Analysis of Cores From South Coles Levee, Calif., and Rangely, Colo., Fields, by George L. Gates, Frank C. Morris, and W. Hodge Caraway. 1950. 25 pp., 19 figs. Study conducted primarily to determine whether uncontaminated cores can be obtained with a conventional-type core barrel using an oil-base drilling fluid having very low rates of filtration as the circulating medium in the borehole.
- †RI 4717. Investigation of Black Rock Manganese Deposits, Esmeralda County, Nev., by W. T. Benson. 1950. 5 pp., 3 figs. In 1942 Bureau investigated the Black Rock manganese property to determine possible reserves of manganese in the deposits. Bureau repaired 5 miles of temporary road; constructed 1,000 feet of new road; excavated 31 trenches, totaling 3,173 feet; dug 91 test pits; and took 134 samples.
- RI 4718. Investigation of Milan Copper Deposit, Coos County, N. H., by Kenneth M. Earl. 1950. 9 pp., 2 figs. In 1948 and 1949 Bureau investigated the Milan copper deposit. Eight holes, totaling 3,596.2 feet, were diamond drilled.
- RI 4719. Investigation of Mercury Deposits, Cinnabar Creek Area, Georgetown and Akiak Districts, Kuskokwim Region, Southwestern Alaska, by F. A. Rutledge. 1950. 9 pp., 7 figs. In 1947 Bureau engineers investigated the mercury deposits by trenching, test pitting, and sampling.
- RI 4720. Burning Anthracite Barley on a Chain-Grate Stoker in a Two-Arch Furnace, by L. R. Burdick and R. E. Morgan. 1950. 7 pp., 7 figs. Gives results of tests made to determine performance of rice and various types of barley on a chain-grate stoker in a two-arch refractory furnace.
- †RI 4721. A Study of Certain Uncommon Minerals Found in the Pacific Northwest, by A. J. Kauffman, Jr., D. M. Mortimore, and H. D. Hess. 1950. 22 pp. Contains identifications and detailed descriptions of 11 uncommon minerals found recently in the Pacific Northwest.

†Out of print.

## Reports of Investigations

- RI 4722. Investigation of the White Zinc-Lead Deposit, Lafayette County, Wis., by W. A. Grosh. 1950. 5 pp., 2 figs. One of a series of reports on a survey begun in 1947 of old lead diggings in the Wisconsin portion of the Upper Mississippi lead-zinc field; summarizes work on the White property to develop western extension of Big Dick ore body, where 4 churn-drill holes, totaling 678 feet, were drilled.
- RI 4723. Investigation of Manganese Deposits in the Philipsburg Mining District, Granite County, Mont., by S. H. Lorain. 1950. 57 pp., 7 figs. In 1940 Bureau investigated the manganese deposits in the Philipsburg mining district. Ten holes from surface stations and 12 from underground stations were diamond drilled.
- RI 4724. Investigation of Furniss Tungsten Deposits, Cabarrus County, N. C., by Jack O. Jones and Alexander L. Peyton. 1950. 14 pp., 7 figs. In 1948, 1949, and 1950, Bureau investigated the Furniss tungsten deposits. Bureau diamond-drilled 12 holes, totaling 1,786.6 feet; examined and sampled underground workings; excavated by bulldozer and by hand 3,155 linear feet of trenches; and collected 71 samples for assay.
- RI 4725. Recent Studies on the Explosibility of Cornstarch, by Irving Hartmann, Austin R. Cooper, and Murray Jacobson. 1950. 9 pp., 14 figs. Describes explosion hazards when powdered starch—extensively used in the confectionery industry—is handled in large quantities.
- RI 4726. Investigation of the J. B. Fluorite Deposit, Beaver County, Utah, by Floyd D. Everett and S. R. Wilson. 1950. 11 pp., 7 figs. Bureau investigated the J. B. fluorite deposit in 1943 and 1944. A total of 1,800 linear feet of trenching, 105 feet of shaft sinking, and 577 feet of drifting and cross-cutting was completed.
- RI 4727. Physical Properties of Mine Rock. Part II, by S. L. Windes. 1950. 37 pp., 7 figs. Describes physical properties of approximately 60 types of rock obtained from operating mines or mineral-investigation projects. (See also RI 4459.)
- RI 4728. Oxidation of Magnetite Concentrates, by John D. Zetterstrom. 1950. 8 pp., 12 figs. Gives results of experiments conducted by Bureau on various factors affecting rate and completeness of oxidation of magnetite concentrates.
- RI 4729. Temperature Entropy Chart of Thermodynamic Properties of Nitrogen, by E. S. Burnett. 1950. 9 pp., 1 fig. Contains a temperature entropy (T. S) chart of the thermodynamic properties of nitrogen prepared from data obtained at Bureau's Cryogenic Laboratory during past 25 years and from the observations of other workers. Includes bibliography.
- RI 4730. Operation of Pilot Plant for Reducing Zinc Concentrates With Methane Gas, by R. D. Van Zante and C. H. Gorski. 1950. 13 pp., 4 figs. Describes pilot-plant operations designed to help solve baffling problems in improving a centuries-old zinc smelting method.
- RI 4731. Investigation of Daggett Chief Manganese Deposit, Manila, Daggett County, Utah, by George W. Heim and Paul T. Allsman. 1950. 9 pp., 3 figs. In 1941 Bureau investigated the Daggett Chief manganese deposit by bulldozer and hand trenching, sinking of two shafts, and sampling.
- RI 4732. Investigation of Twin Buttes Copper Mines, Pima County, Ariz., by Joseph B. Cummings and T. M. Romslo. 1950. 12 pp., 12 figs. In 1942 and 1943 Bureau investigated the Twin Buttes copper mines by mapping, test pitting, trenching, and sampling and later made a geophysical survey in the mapped area.
- RI 4733. Pilot-Plant Gasification of Pulverized Coal With Oxygen and Highly Superheated Steam, by G. R. Strimbeck, J. H. Holden, L. P. Rockenbach, J. B. Cordiner, Jr., and L. D. Schmidt. 1950. 41 pp., 55 figs. Describes experiments and results on pilot-plant gasification of pulverized coal entrained in oxygen and steam. Work done in cooperation with University of West Virginia.
- †RI 4734. Estimate of Known Recoverable Reserves of Coking Coal in Cambria County, Pa., by James J. Dowd, Louis A. Turnbull, Albert L. Toenges, H. M. Cooper, R. F. Abernethy, D. A. Reynolds, and Thomas Fraser. 1950. 25 pp., 6 figs. Gives results of an investigation conducted by Bureau to estimate known recoverable reserves of all coking coal in Cambria County; includes brief résumé of the chemical analyses and carbonization and preparation characteristics of the coals; and contains a table of estimated reserves as of January 1, 1948, for each coal bed in the county.
- RI 4735. Physical Properties of Coke: Size and Its Measurement, by H. Stuart Auvil and John B. Gayle. 1950. 27 pp., 9 figs. First of several reports on results of studies being made to develop accurate methods of testing the coke-producing qualities of various coals and coal blends, this report describes sampling and statistical procedures followed and results obtained in testing 12 samples of run-of-oven coke taken at plants in United States and Canada.
- RI 4736. Oil Shale in Spain, by H. M. Thorne and A. J. Kraemer. 1950. 21 pp., 2 figs. Describes facilities in the Puertollano area of Ciudad Real Province, Spain, where oil shale has been mined and retorted and shale oil refined commercially since 1922.
- †RI 4737. Investigation of Southwestern Arkansas Mercury District, Howard, Pike, and Clark Counties, Ark., by L. T. McElvenny, M. Clair Smith, and Robert B. McElwaine. 1950. 25 pp., 9 figs. In 1944 Bureau investigated 57 mine dumps and the calcine dumps of 13 furnaces and 4 retorts to ascertain the possibility of recovering mercury from them. During Bureau's initial investigation of these deposits in 1941, 12 holes, totaling 3,539 feet, were diamond drilled; 85 core and 77 sludge samples were analyzed for mercury; 5,309 linear feet of surface trenches were cut in 6 areas, and 19 samples were collected for analysis; and 86 channel samples, aggregating 430 linear feet of channel, were cut by hand.
- RI 4738. Undecomposed Steam in Lignite Gasification, by M. H. Chetrick. 1950. 11 pp., 4 figs. Discusses water-gas formation in gasification of lignite, describes effect of temperature and effect of mechanical design of retort on gas compositions, and includes a summary of calculated results from pilot-plant operations.
- RI 4739. Some Innovations in Equipment for Scaling High Roofs and Mine Walls, by Brinton C. Brown, Fred D. Wright, and Homer J. Ballinger. 1950. 11 pp., 12 figs. Describes new and unique equipment developed by Bureau for placing men in position to scale loose rock from walls, pillars, and roofs of high stopes or rooms in underground mines.
- RI 4740. Petroleum-Engineering Study of the Weber Pool, Washington County, Okla., by Kenneth H. Johnston and C. W. Moot, Jr. 1950. 47 pp., 38 figs. Conditions in the Weber oil pool are such that water flooding should increase the ultimate recovery substantially, according to this petroleum-engineering study. Includes history of the development of the Weber pool, description of the geology, production records, and reserve calculations. Work done in cooperation with State of Oklahoma.

†Out of print.



- RI 4741. Transmission Characteristics in the Visible Spectral Region of the Quinalizarin and Beryllium-Quinalizarin Complex in N/4 Sodium Hydroxide Solution, by Graham W. Marks and H. Tracy Hall. 1950. 5 pp., 3 figs. In connection with the development of a chemical method of analysis for beryllium, the transmission characteristics of quinalizarin and beryllium-quinalizarin complex in N/4 NaOH solution were determined by a Baird grating spectrograph. Description of Baird spectrograph is included.
- †RI 4742. Laboratory-Scale Work on Synthesis-Gas Production, by J. J. S. Sebastian, P. W. Edeburn, F. Bonar, L. W. Bonifield, and L. D. Schmidt. 1951. 41 pp., 21 figs. Describes work at Morgantown, W. Va., station of Bureau of Mines; work done in cooperation with West Virginia University. Part I concerns development of a process in a laboratory unit operating on entrained powdered coal; as far as known, this is the first pulverized-fuel gasification unit in this country capable of continuous operation. Part II describes results obtained with an experimental pilot unit for underground gasification studies with highly superheated steam and oxygen. This project was undertaken in cooperation with Dr. Albert DeSmaele, chairman of the board of SOCOGAZ, in Belgium, to study underground production of synthesis gas from coal.
- RI 4743. Investigation of the Almedia Lead-Zinc Deposit, Columbia County, Pa., by Kenneth M. Earl. 1950. 9 pp., 3 figs. In 1949 Bureau investigated the Almedia lead-zinc deposit. Four holes, aggregating 1,126.3 feet, were diamond drilled.
- †RI 4744. A Thermal Decomposition Study of Colorado Oil Shale, by Arnold B. Hubbard and W. E. Robinson. 1950. 24 pp., 13 figs. Presents information that would be valuable in the design and operation of commercial retorts for retorting oil from oil shale. Describes a laboratory study of the rate at which kerogen—organic matter largely insoluble in solvents for petroleum but easily converted to gas, shale oil, and residual carbon by heat—is separated from oil shale at various temperatures.
- RI 4745. Investigation of Canyon Diggings Zinc-Lead Deposit, Newton County, Mo., by L. C. Brichta and S. A. Allen. 1951. 115 pp., 3 figs. Bureau investigated this property in 1948 and 1949 by churn-drilling and sampling 85 holes, aggregating 10,571 feet of bore, and sampling 2 mill-tailings dumps and 3 mine dumps. In the northern part of the deposit predominant metal is lead and in the southern part, zinc. Logs of drill holes are included.
- †RI 4746. National Annual Diesel-Fuel Survey, 1950, by O. C. Blade. 1950. 25 pp., 1 fig. First in a series of national annual diesel-fuel surveys issued by Bureau in cooperation with American Petroleum Institute. Rapid increase in the use of diesel fuel oil as a source of power in recent years has resulted in a need for more information on the types and quality of such fuels currently marketed. Data on 266 samples of diesel fuel were contributed to Bureau by 56 companies that reported their tests on their own products.
- RI 4747. Preparation Characteristics of Coal Occurring in Cambria County, Pa., by William L. Crentz and Fern Steele. 1950. 40 pp., 19 figs. Gives results of study of the preparation characteristics of reserves of coal in Cambria County undertaken to determine which are suitable under present standards for producing metallurgical coke, either as mined or after upgrading by conventional preparation methods, and which would require special and more intensive preparatory treatment.
- RI 4748. Investigation of the Royal John Lead-Zinc Deposits, Grant County, N. Mex., by John H. Soule. 1950. 8 pp., 9 figs. A second development project, conducted by Bureau in 1948 and 1949, on the Royal John lead-zinc deposits consisted of 1,938.4 feet of diamond drilling, complete mapping of the area, and channel sampling of the mine openings. Two hundred and forty samples were analyzed.
- RI 4749. Centrifugal Pump Installations in Anthracite Mines of Pennsylvania, by William H. Lesser. 1950. 22 pp., 25 figs. Describes centrifugal pumps that have proved successful in mine pumping plants in the Pennsylvania anthracite region. Includes descriptions of pumps made by manufacturers who specialize in their construction.
- †RI 4750. Pilot-Plant Smelting of Ilmenite in the Electric Furnace, by C. Kerby Stoddard, Sanford S. Cole, L. T. Eck, and C. W. Davis. 1950. 15 pp., 6 figs. Describes tests made in Bureau's electrometallurgical laboratory at Boulder City, Nev., in which ilmenite was smelted in two electric furnaces, one large and the other small, to produce a titanium-rich slag and marketable pig iron. Work done under cooperative agreement with Titanium Division of National Lead Co.
- RI 4751. Effect of High Pressures on the Explosibility of Mixtures of Ethane, Air, and Carbon Dioxide and of Ethane, Air, and Nitrogen, by R. E. Kennedy, I. Spolan, W. K. Mock, and G. S. Scott. 1950. 11 pp., 6 figs. Increasing the pressure on mixtures of certain explosives gases widens limits of explosibility of the gases and thereby reduces margin of safety in handling the gases, according to this report which deals with ethane, an explosive hydrocarbon gas, in natural gas.
- RI 4752. Contribution to the Metallurgy of Chromium, by W. J. Kroll, W. F. Hergert, and W. R. Carmody. 1950. 19 pp., 7 figs. Describes an experimental study of a number of methods for producing high-purity chromium.
- RI 4753. A Colorimetric Method for the Determination of Thiophene in Synthesis Gas, by H. W. Wainwright and G. I. Lambert. 1950. 11 pp., 7 figs. Describes a procedure for determining presence of thiophene, an organic sulfur compound, in synthesis gas containing low amounts of unsaturated hydrocarbons.
- RI 4754. Concentration of Oxide and Silicate Manganese Ores From the Vicinity of Golconda, Nev., by B. K. Shibley and R. R. Wells. 1951. 16 pp. Laboratory tests were made to determine the amenability to concentration of ores from five manganese properties near Golconda, Nev. These were Tom Major, Black Top, Black Hawk, Black Diablo, and O'Leary. Description of the ore, discussion of concentrating methods, and results of laboratory tests are described for each of these properties separately.
- RI 4755. Phenol and Cresols in Coal Tar From Coals Carbonized at 800° and 900° C., by Erik Bengtsson; revised by R. E. Brewer. 1950. 10 pp. Gives results of investigation of the phenol and cresol contents of tar samples obtained after 5 Kentucky and West Virginia coals were carbonized at 800° and 900° C.
- RI 4756. Decomposition Temperatures of Polytetrafluorethylene and Polymonochlorotrifluoroethylene as Indicated by Halogen Liberation, by H. A. Watson, H. J. Stark, L. E. Siefert, and L. B. Berger. 1950. 6 pp., 4 figs. Discusses and presents results of tests conducted to determine temperatures at which gases were produced when small specimens of the two polymers were heated and to determine identity of the major constituents of the gaseous products. Work done in cooperation with Bureau of Ships, United States Department of the Navy.

†Out of print.

Reports of Investigations

- RI 4757. Estimate of Known Recoverable Reserves of Coking Coal in Indiana County, Pa., by James J. Dowd, Louis A. Turnbull, Albert L. Toenges, H. M. Cooper, R. F. Abernethy, D. A. Reynolds, and William L. Crenzt. 1950. 22 pp., 5 figs. Gives results of an investigation conducted by Bureau to estimate known recoverable reserves of coking coal in Indiana County; includes brief résumé of the chemical analyses and carbonization and preparation characteristics of the coals; and contains a table of estimated reserves as of January 1, 1948, for each coal bed in the county.
- RI 4758. Simple Treatment Methods for Oxide Gold and Silver Ores, by A. L. Engel. 1951. 14 pp. Gives results of treating various western gold and silver ores, including Blairsden, Calif., gold-bearing dump ore; Kennedy mine, Calif., gold tailings; Gilt Edge, Mont., cyanide tailings; Battle Mountain, Nev., silver-gold ore and lead-gold-silver ore; Bell Mountain, Nev., gold-silver ore; Bootstrap mine, Nev., gold ore; Eureka, Nev., silver-zinc-lead ore; Kimberley, Nev., oxidized lead ore; Washoe County, Nev., oxidized lead ore; and Whitewood Creek, S. Dak., gold tailings.
- RI 4759. The Short-Circuiting Contactor as an Electrical Protective Device for Coal-Mine Service, by L. H. Harrison. 1951. 11 pp., 5 figs. Describes construction of a short-circuiting contactor—a device that cuts off power the moment an accidental short circuit occurs and transfers the short to a harmless location until fuse has time to blow or circuit-breaker to trip—and preliminary surface tests and subsequent underground tests to which the device was subjected.
- RI 4760. Investigation of West Belt Copper-Zinc Mines, El Dorado, Amador, Calaveras, and Mariposa Counties, Calif., by Frank J. Wiebelt, W. C. Sanborn, R. R. Trengove, and Spangler Ricker. 1951. 62 pp., 13 figs. In 1943 and 1944 Bureau investigated seven copper-zinc mines in California—Copper Hill, Newton, Gray House, Constellation, North Keystone, Collier, and American Eagle mines. In addition to surface sampling and mapping, 27 holes, aggregating 15,423.5 feet, were diamond drilled.
- RI 4761. Variance in Characteristics of the Oil in the Weber Sandstone Reservoir, Rangely Field, Colo., by Cecil Q. Cupps, Philip H. Lipstate, Jr., and Joseph Fry. 1951. 68 pp., 34 figs. Gives results of comprehensive study of characteristics of the original oil in Weber sandstone reservoir. Includes bibliography.
- RI 4762. Experimental Treatment of Oxidized Lead-Silver Ore From Eureka, Nev., by A. L. Engel. 1951. 9 pp. A representative sample of lead-silver ore from the Diamond district near Eureka, Nev., was subjected to various types of treatment, including gravity concentration tests, flotation tests, and cyanidation tests. Two suggested flow sheets are given.
- RI 4763. Preparation Characteristics of Coal Occurring in Indiana County, Pa., by William L. Crenzt, Fern Steele, and A. L. Bailey. 1951. 33 pp., 20 figs. Deals with upgrading to metallurgical standards of the large reserves of coal remaining in Indiana County.
- RI 4764. Design, Construction, and Operation of a Distillation Laboratory for the Synthetic Liquid Fuels Program, by J. Feldman, P. Pantazoplos, G. Pantazoplos, and M. Orchin. 1951. 4 pp., 14 figs. Describes Bureau of Mines distillation laboratory at Bruceton, Pa., which was established to aid in the separation and identification of the products resulting from synthetic liquid fuels processes being studied there.
- RI 4765. National Motor-Gasoline Survey, Summer 1950, by O. O. Blade. 1950. 33 pp., 3 figs. Based on tests of gasolines collected during July and August from 212 cities in 17 marketing areas of the United States, this survey includes 2,859 samples obtained from service stations of 117 large and small petroleum suppliers. Work done in cooperation with American Petroleum Institute.
- RI 4766. Universal-Type Electrostatic Separator, by Foster Fraas and Oliver C. Ralston. 1951. 4 pp., 2 figs. A universal-type electrostatic separator that can be adjusted to meet the metallurgical testing requirements of all varieties of ores has been developed by Bureau. Presents detailed description of the separator, with specific applications, and includes photograph and engineering sketches.
- RI 4767. Concentration of Carbonate and Oxide Manganese Ores From Silver Bow, Jefferson, and Park Counties, Mont., by K. C. Dean and J. V. Batty. 1951. 22 pp. Bureau engineers examined samples of manganese ores from four properties in Montana. Tests were made to determine the amenability of these ores to standard ore-dressing methods of concentration to produce marketable-grade products.
- RI 4768. Variable Characteristics of the Oil in the Tensleep Sandstone Reservoir, Elk Basin Field, Wyoming and Montana, by Ralph H. Espach and Joseph Fry. 1951. 24 pp., 13 figs. Shows that physical properties of oil taken from various wells in the Tensleep sandstone formation in the Elk Basin field differ widely. Bureau engineers analyzed samples from the bottom of nine wells in various parts of the formation for such physical characteristics as volume of gas in solution, saturation pressure or bubble points, shrinkage in volume caused by release of gas from solution, expansion of oil with decrease in pressure, and other related properties. They also studied composition of the gas in solution in the oil and determined pressures and temperatures in the reservoir and production characteristics of the wells. Work done in cooperation with University of Wyoming.
- RI 4769. Green River Oil-Shale Reserves of Northwestern Colorado, by Carl Beiser. 1951. 13 pp., 49 figs. Describes methods used in sampling and assaying oil-shale reserves of the Green River formation in northwestern Colorado and discusses geology of the area.
- RI 4770. Synthetic Liquid Fuels. Annual Report of the Secretary of the Interior for 1950. Part I. Oil From Coal. 1951. 74 pp., 66 figs. Deals primarily with progress made in producing synthetic liquid fuels from coal. Includes bibliography.
- RI 4771. Synthetic Liquid Fuels. Annual Report of the Secretary of the Interior for 1950. Part II. Oil From Oil Shale. 1951. 88 pp., 75 figs. Deals primarily with progress made in producing synthetic liquid fuels from oil shale. Includes bibliography.
- RI 4772. Synthetic Liquid Fuels. Annual Report of the Secretary of the Interior for 1950. Part III. Liquid Fuels From Agricultural Residues. 1951. 12 pp., 5 figs. Gives results of progress made in producing synthetic liquid fuels from agricultural wastes for the period January 1 to June 30, 1950, when the plant was closed; also includes a broad review of the accomplishments made to date and a summary of the unfinished part of the program.
- RI 4773. Synthetic Liquid Fuels. Annual Report of the Secretary of the Interior for 1950. Part IV. Oil from Secondary Recovery and Refining. 1951. 16 pp., 6 figs. Gives results of research on secondary recovery methods as applied to stripper oil fields and on refining processes from January 1 to June 30, 1950. On July 1, 1950, this research program on secondary recovery and chemistry and refining was combined with the Bureau's oil and gas investigations.

- †RI 4774. Investigation of Copper Canyon Lead-Zinc Deposit, Lander County, Nev., by Russell B. Trenrove. 1951. 61 pp., 7 figs. In 1949 and 1950 Bureau investigated the Copper Canyon lead-zinc deposit. Eighteen holes, totaling 2,594 feet, were diamond drilled.
- RI 4775. The Role of Oxygen in the Production of Synthetic Liquid Fuels From Coal, by H. R. Batchelder, R. G. Dressler, R. F. Tenney, L. C. Skinner, and L. L. Hirst. 1951. 15 pp., 3 figs. Discusses relationship between these phases: The factors that affect oxygen manufacture and costs, the methods for the use of oxygen and for the production of synthetic liquid fuels, and, to some extent, the economic factors that must be considered.
- RI 4776. The Oil-Shale Industries of Europe, by Boyd Guthrie and Simon Klosky. 1951. 73 pp., 65 figs. Describes oil-shale industries of six European countries—Scotland, Sweden, France, Spain, Germany, and Estonia. The technical data on oil-shale operations in these countries were obtained by Bureau technologists visiting the oil-shale mines and plants in each of these countries except Estonia. Data on operations in Estonia were obtained from literature made available before that country passed under the domination of the Germans and subsequently of the Russians.
- RI 4777. Thermal Decomposition Products and Burning Characteristics of Some Synthetic Low-Density Cellular Materials, by H. A. Watson, H. J. Stark, R. L. Beatty, H. W. Busch, and L. B. Berger. 1951. 16 pp., 6 figs. Covers investigation of hazards from toxic gases produced by burning or thermal decomposition of some low-density, expanded, synthetic materials, 3 consisting of polyvinylchloride and 1 of acrylonitrile. Carbon monoxide appeared to be principal toxic gas evolved; scaller amounts of aldehydes, ammonia, cyanides, oxides of nitrogen, and hydrogen chloride were other decomposition products identified. Work done in cooperation with Bureau of Ships, United States Department of the Navy.
- RI 4778. Electrolytic Model Studies as Applied to Water-Flooding a Shoestring Sand, by William E. Eckard and Jack A. Mason. 1951. 18 pp., 17 figs. Describes electrolytic model tests of various well patterns and spacings applicable to water-flooding a shoestring reservoir and shows effect of these factors upon recovery of oil and most profitable operation of the pool.
- RI 4779. Spectrophotometric Studies of the Isomers of Chromic Sulfate, by Graham W. Marks. 1951. 9 pp., 7 figs. To gain further knowledge concerning general positions of the absorption maxima of aqueous solutions of the violet and green isomers of chromic sulfate in the visible spectral region and to investigate possibilities of developing an analytical method for determining the concentrations of the violet and green isomers in a mixture, an investigation was made in the spectral range from 325 to 850 millimicrons. Results of investigation are given.
- RI 4780. Concentration of Oxide Manganese Ores From Lander County, Nev., by T. F. Mitchell, R. R. Wells, and W. G. Sandell. 1951. 16 pp. Bureau engineers examined samples of manganese ore from five properties in Lander County. As the ores were too low in grade to be acceptable for direct production of ferromanganese, their amenability to concentration by ore dressing was investigated.
- RI 4781. Performance of a Pebble-Heater-Type Steam Superheater, by H. R. Batchelder and H. A. Ingols. 1951. 8 pp., 8 figs. Presents data on the operation of a natural-gas-fired, pebble-heater type of steam superheater in Bureau of Mines Gas-Synthesis Demonstration Plant at Louisiana, Mo.; shows graphically operating temperatures, steam flows, and heat loads for period of operation covering about 1 year; includes calculations of the thermal efficiencies of the unit under various operating conditions; and presents data from which the rate of wear was computed for the 2 types of pebbles used.
- †RI 4782. Investigation of a Photoelectric Device for the Determination of Low Concentrations of Dust, by D. E. Stone, L. J. Kane, T. E. Corrigan, H. W. Wainright, and C. B. Seibert. 1951. 6 pp., 6 figs. Discusses methods used and results of tests made on a photoelectric device for determining extremely low concentrations of dust in synthesis gas—a mixture of carbon monoxide and hydrogen.
- RI 4783. Chromite Deposits: Sweetwater, Castro, Trinidad, New London, and Hilltop Mines, San Luis Obispo County, Calif., by M. Clair Smith and Spangler Ricker. 1951. 7 pp., 9 figs. Work by Bureau of Mines at these mines included surveying, mapping, trenching, sampling, and assaying.
- RI 4784. Investigation of the Norwich Manganese Deposit, Silver Bow County, Mont., by John W. Cole. 1951. 14 pp., 6 figs. Gives results of a core-drilling program conducted by Bureau in 1949 and 1950 to develop ore in the Norwich mine, the workings of which were then flooded and inaccessible.
- RI 4785. Concentration of Oxide Manganese Ores From the Steelville and Susie Q Claims, Beaver County, Utah, by K. C. Dean and K. C. Vincent. 1951. 8 pp. Gives results of concentration tests made on two low-grade manganese ores.
- RI 4786. Selective Flotation Concentration of Lead-Zinc Ores From the Musick and Helena Mines, Bohemia District, Oreg., by T. A. Hendrickson, W. A. Stickney, and R. R. Wells. 1951. 9 pp. Describes methods for producing separate lead and zinc concentrates from ores taken from the Musick and Helena mines. Includes chemical and spectrographic analyses of each ore.
- RI 4787. Study of Preheating Colorado Oil Shale, by W. E. Robinson and Arnold B. Hubbard. 1951. 13 pp., 7 figs. Gives results of study made to determine whether drying and preheating Colorado oil shale with waste retort has any appreciable effect on its oil yield. Work done in cooperation with University of Wyoming.
- RI 4788. Preparation Characteristics of Coal Occurring in Armstrong County, Pa., by William L. Cretz, Fern Steele, and A. L. Bailey. 1951. 25 pp., 17 figs. Third in a series, report deals with upgrading to metallurgical standards of the large reserves of coal in Armstrong County.
- RI 4789. National Annual Survey of Commercial Aviation Gasoline, October 1950 Production, by O. C. Blade. 1951. 11 pp., 4 figs. Describes survey of aviation fuels. Based on test data furnished by 17 manufacturers of aviation gasoline, survey includes 54 samples of commercial aviation gasoline. In addition, data on 29 samples of aviation fuel designated for military use only are given but are not included in the averages. Work done in cooperation with American Petroleum Institute.
- RI 4790. Simple Treatment Methods for Sulfide Gold and Silver Ores, by A. L. Engel. 1951. 17 pp. Describes preliminary tests on 10 samples of sulfide ores that contained gold and silver and in some cases base metals from deposits in California, Idaho, and Nevada to determine the best treatment methods.
- RI 4791. Investigation of the Torpedo Copper Deposit, Oregon Mining District, Dona Ana County, N. Mex., by John H. Soulé. 1951. 10 pp., 6 figs. In 1949 and 1950 Bureau investigated the Torpedo copper deposit. Four holes, totaling 2,122 feet, were diamond drilled.

Reports of Investigations

- RI 4792. Estimate of Known Recoverable Reserves of Coking Coal in Pike County, Ky., by James J. Dowd, Louis A. Turnbull, Albert L. Toenges, R. F. Abernethy, and D. A. Reynolds. 1951. 34 pp., 13 figs. Gives results of investigation conducted by Bureau to estimate known recoverable reserves of all coking coal in Pike County; includes brief résumé of the chemical analyses of the coals; and contains a table of estimated reserves as of January 1, 1948, for each coal bed in the county.
- RI 4793. Report of Research and Technologic Work on Explosives, Explosions, and Flames, Fiscal Year 1950, by Bernard Lewis. 1951. 67 pp., 51 figs. Summarizes fundamental research and technical studies conducted by Explosives and Physical Science Division for the 12 months ended June 30, 1950. Report covers explosives research, chemical and physical tests on explosives, flame and combustion research, flammability of gases and vapors, and Experimental mine coal-dust explosions.
- RI 4794. Anthracite Mechanical Mining Investigations. Progress Report 3: Preliminary Testing of Korfmann Universal Shearing Machine, Model SK 20, by John W. Buch and Andrew Allan, Jr. 1951. 11 pp., 14 figs. Preliminary tests show that the Korfmann universal shearing machine, imported by Bureau from Germany for experimentation, promises to be useful for mechanized mining of steeply pitching anthracite beds. The Korfmann universal shearing machine, model SK 20, is a compressed-air-operated, track-mounted, cutting-shearing machine, equipped with cutter bar and endless bit-chain of conventional design, and weighs 3,000 pounds. Cutting mechanism can be rotated to cut in any direction. Tests were conducted to determine power characteristics of the machine and its maneuverability and effectiveness when used in anthracite mining. (See also RI 4500.)
- RI 4795. Water Flooding of Oil Sands in Washington County, Okla., by C. H. Riggs and William C. Smith. 1951. 16 pp., 18 figs. Describes five water-flooding projects in Washington County—Sunray Oil Co. White-Barrett project, The Keener Oil & Gas Co. Bartles Fee-Shailer project, Forest Oil Corp. Flood No. 23, Wellsville Oil Co. Flood No. 6, and Cooperative Refinery Association Hicks Unit and No. 2 Unit project. Gives brief history, methods employed, and results obtained in barrels of oil produced as a result of the water flooding.
- RI 4796. Oil-Shale Operations in New South Wales, Australia, by A. J. Kraemer and H. M. Thorne. 1951. 48 pp., 23 figs. Describes how Australia has been producing motor gasoline and allied products on a commercial scale from native oil shale. Report is based upon observations of Bureau technologists who visited the plant and mine of the National Oil Proprietary, Ltd., at Glen Davis, New South Wales, in 1947, supplemented by laboratory tests of Australian oil shale and shale oil.
- RI 4797. Combustion Characteristics and Physical Properties of Packaged Fuels Containing Bituminous Coal, by James W. Meyer and Richard C. Corey. 1951. 30 pp., 10 figs. Describes combustion characteristics and physical properties of six different lots of packaged fuels made from bituminous coal.
- RI 4798. Anthracite Mechanical Mining Investigations. Progress Report 4: Status of Bureau of Mines Underground Experimental Work With Lightweight Shearing Machines in Pitching Anthracite Beds, by John W. Buch, Andrew Allan, Jr., and Russell S. Davies. 1951. 11 pp., 7 figs. Progress report from February 1, 1949, to August 15, 1949, covering experiments with lightweight shearing machines for developing thin, steeply pitching anthracite beds. (See also RI 4500.)
- RI 4799. A Survey on the Hydraulic Transportation of Coal, by R. W. Dougherty. 1951. 22 pp. About \$10,000,000 would build a pipeline 100 miles long capable of transporting 5,000 tons of coal a day with water, and the estimated cost of moving the coal 100 miles in the completed pipeline would be between \$1.28 and \$1.91 a ton, according to this report. Estimates are given for constructing and operating the same length pipeline transporting larger tonnages of coal. Report includes a brief historical account of the hydraulic transportation of coal, a review of published literature on the subject, a résumé of industry opinions, and economic studies.
- RI 4800. Diamond Orientation in Diamond Bits. 1. Procedures and Preliminary Results, by Albert E. Long. 1951. 16 pp., 10 figs. Describes preliminary experiments conducted by Bureau engineers to improve the efficiency of diamond-tipped drills used in the minerals industry to bore through hard rock, copper, iron, and other ore deposits. Results indicate that by proper orientation of the diamonds in diamond bits the drilling performance of the bit is increased and the diamond loss per unit of work performed is greatly reduced. (See also RI 4853.)
- RI 4801. Estimate of Known Recoverable Reserves of Coking Coal in Armstrong County, Pa., by James J. Dowd, Louis A. Turnbull, Albert L. Toenges, R. F. Abernethy, and D. A. Reynolds. 1951. 16 pp., 6 figs. Known coking-coal reserves in Armstrong County are estimated at 1,550,082,000 tons, and known recoverable reserves, 28 inches and more thick, are estimated at 574,370,000 short tons. Report includes table of estimated reserves as of January 1, 1949, for each of the coal beds in the county and maps showing areas and locations of reserves, mined-out areas, areas excluded from the estimate, and areas outside the bed outcrop for five of the beds.
- RI 4802. Size of Smallest Particles Determined in Impinger Dust-Counting Methods, by Carlton E. Brown, Morris Fisher, and Florence Feicht Boyer. 1951. 19 pp., 7 figs. Tests conducted by Bureau show that smaller particles of silica dust and bituminous-coal dust can be detected by a dark-field counting method than by a light-field one. Dust-counting methods and related principles of microscopy are discussed, and techniques of sampling with the impinger apparatus and of counting dust particles in the resulting samples are described.
- RI 4803. Estimate of Known Recoverable Reserves of Coking Coal in Westmoreland County, Pa., by James J. Dowd, Louis A. Turnbull, Albert L. Toenges, R. F. Abernethy, and D. A. Reynolds. 1951. 16 pp., 4 figs. Known reserves of coking coal in Westmoreland County are estimated at 922,268,000 tons, and known recoverable reserves in beds 28 inches and more thick are estimated at 523,338,000 short tons. A table of estimated reserves as of January 1, 1950, for each of the coal beds is included.
- RI 4804. Magnetic Base Stations in Lake Superior Iron Districts, by Gordon D. Bath. 1951. 16 pp., 18 figs. Describes establishment of several primary magnetic base stations near important iron-producing districts in Minnesota, Michigan, and Wisconsin and gives suggestions for using them as an aid to geophysical prospecting, including determining sensitivity and establishing a common datum.
- RI 4805. Production, Consumption, and Use of Fuels and Electric Energy in the United States in 1929, 1939, and 1947, by William H. Lyon and D. S. Colby. 1951. 90 pp. This statistical study of the production, consumption, and use of fuels and electric energy in the United States in 1929, 1939, and 1947 is believed to fill an important need in planning future energy requirements of the United States.
- RI 4806. The Thermodynamics of Combustion Gases: General Considerations, by Stuart R. Brinkley, Jr., and Bernard Lewis. 1952. 61 pp. First of a series

- presenting results of the study for particular fuel-oxidant systems, report includes stoichiometry and application of the phase rule, calculation of the equilibrium composition, computation programs for carbon-hydrogen-oxygen-nitrogen systems, thermodynamic properties of gas mixtures, and description of a generalized table of the equilibrium composition and thermodynamic properties of combustion gases. (See also RI 4938, 4958, and 4983.)
- RI 4807. Estimate of Known Recoverable Reserves of Coking Coal in Fayette County, Pa., by James J. Dowd, Louis A. Turnbull, Albert L. Toenges, R. F. Abernethy, and D. A. Reynolds. 1951. 19 pp., 5 figs. Known reserves of coking coal in Fayette County are estimated at 942,637,000 tons, and known recoverable reserves, 28 inches and more thick, are estimated at 470,257,000 short tons. A table of estimated reserves as of January 1, 1950, for each of the coal beds is included.
- RI 4808. The Second Underground Gasification Experiment at Gorgas, Ala., by James L. Elder, M. H. Fies, Hugh G. Graham, R. C. Montgomery, L. D. Schmidt, and E. T. Wilkins. 1951. 72 pp., 30 figs. This experiment in underground gasification of coal at Gorgas, the second conducted jointly by Bureau and Alabama Power Co., was operated continuously for 22½ months. The primary objectives of this second experiment were to extract the energy contained in unmined coal and to obtain fundamental knowledge relating to underground gasification of coal.
- RI 4809. National Motor-Gasoline Survey, Winter 1950-51, by O. C. Blade. 1951. 34 pp., 3 figs. Octane ratings of regular- and premium-price gasolines sold at filling stations in the United States during the winter of 1950-51 increased two-tenths to six-tenths of an octane number above the preceding summer. Based on tests of gasolines collected during December 1950 and January and February 1951 from cities in 17 marketing areas of the United States, this survey included 4,029 samples obtained from service stations of 135 large and small petroleum suppliers. Work done in cooperation with American Petroleum Institute.
- RI 4810. Equipment Tested at the Bureau's Oil-Shale Mine, by Fred D. Wright, Homer J. Ballinger, Ernest E. Burgh, Brinton C. Brown, and Lothar Fieg. 1951. 13 pp., 17 figs. Describes new equipment tested by Bureau for drilling vertical holes, hauling explosives, conditioning diesel exhaust gas, and cleaning blast holes at Bureau's Experimental Oil-Shale mine near Rifle, Colo., that might be used in many of the country's underground mines where room-and-pillar method of mining is employed.
- RI 4811. Investigation of Melrose Zinc-Lead Deposit, Cherokee County, Kans., by L. C. Brichta and S. A. Allen. 1951. 97 pp., 9 figs. In 1949 and 1950 Bureau investigated the Melrose zinc-lead deposit by churn-drilling and sampling 23 holes, aggregating 10,405 feet of bore.
- RI 4812. Explosibility of Mixtures of Propane, Air, and Carbon Dioxide and of Propane, Air, and Nitrogen at Elevated Pressures, by R. E. Kennedy, I. Spolan, and G. S. Scott. 1951. 9 pp., 5 figs. Gives results of tests to determine limits of flammability in air of various mixtures of propane and carbon dioxide at 100 and 200 p. s. i. g. and to determine ranges of flammability of propane-air-nitrogen mixtures at pressures of 100 and 200 p. s. i. g.
- RI 4813. Estimate of Known Recoverable Reserves of Coking Coal in Floyd County, Ky., by James J. Dowd, Louis A. Turnbull, Albert L. Toenges, R. F. Abernethy, and D. A. Reynolds. 1951. 16 pp., 6 figs. Known reserves of coking coal in Floyd County are estimated at 1,607,407,000 short tons and known recoverable reserves 28 inches and more thick are estimated at 694,667,000 short tons. Report includes table of estimated reserves as of January 1, 1949, for each of the coal beds.
- RI 4814. Miller Gulch and Cook and White Coal Beds, Near Cerrillos, Santa Fe County, N. Mex.: Reserves; Coking, Petrographic, and Chemical Properties, by Louis A. Turnbull, Albert L. Toenges, J. D. Davis, D. A. Reynolds, and B. C. Parks. 1951. 29 pp., 5 figs. Describes characteristics and properties of coals found in the Miller Gulch and the Cook and White coal beds examined for their possible use in western steel blast furnaces.
- RI 4815. Preparation Characteristics of Coal From Fayette County, Pa., by William L. Crentz, A. L. Bailey, and J. W. Miller. 1951. 16 pp., 37 figs. Fourth in a series, report deals with upgrading to metallurgical standards of the large reserves of coal remaining in Fayette County.
- RI 4816. Investigation of Sodium Sulfate Deposits in Bull Lake, Carbon County, Wyo., by W. A. Young. 1951. 9 pp., 6 figs. In 1949 Bureau investigated the sodium sulfate deposits in Bull Lake. Eleven holes, totaling 512 feet, were drilled. Eight holes were drilled with a diamond core bit, and 3 were drilled almost entirely with an Iwan-type auger bit.
- RI 4817. Semipilot-Plant Investigations on Electro-winning Manganese From Chloride Electrolytes, by J. H. Jacobs, P. E. Churchward, T. E. Hill, Jr., W. H. Curry, E. C. Perkins, and O. Q. Leone. 1951. 13 pp., 1 fig. Describes the successful production of electrolytic manganese with a purity of 99.9 percent from low-grade ore from the Three Kids mine, Las Vegas Wash, Clark County, Nev., by use of a chloride electrolyte. Paper was presented before American Institute of Mining and Metallurgical Engineers, St. Louis meeting, February 1951.
- RI 4818. Concentration of Oxide Manganese Ores From Black Rock, Kramer, and Morgan-Cromar Properties, Tooele and Juab Counties, Utah, by J. V. Batty and R. Havens. 1952. 17 pp. Contains summarized results of laboratory tests of samples of oxide manganese ore from the Black Rock, Kramer, and Morgan-Cromar (Black Jack) properties.
- RI 4819. Cyanidation of Gold-Silver Ore From Manhattan, Nev., by A. L. Engel. 1951. 6 pp. Describes tests made to study application of activated carbon in the cyanidation treatment of gold-silver ore from the Keystone mine, Manhattan, Nye County, Nev.
- RI 4820. Investigation of the Cougar Spar Fluorspar Deposit, Beaver County, Utah, by Floyd D. Everett and Stephen R. Wilson. 1951. 12 pp., 17 figs. In 1942 and 1943 Bureau developed the Cougar Spar fluor-spar deposit by surface trenching, totaling 440 linear feet, drifting, and crosscutting. Two hundred and twenty-two samples were taken for assay from surface trenches and underground workings.
- RI 4821. Raw Materials for the Mineral-Wool Industry, by C. H. Gorski, O. D. White, and M. L. Moreland. 1951. 8 pp., 1 fig. Describes results of tests conducted by Bureau in its Mississippi Valley Experiment Station on various raw materials for the preparation of mineral wool.
- RI 4822. Processes for Recovering Vanadium From Western Phosphate, by Lloyd H. Banning and R. T. C. Rasmussen. 1951. 44 pp., 2 figs. Describes processes for recovering vanadium from western phosphate. A combination of the beneficiating, smelting, and roast-leach processes described may make it economically feasible to recover vanadium, as well as phosphorus, from a vast tonnage of western phosphate rock.
- RI 4823. Preparation Characteristics of Coal Occurring in Westmoreland County, Pa., by William L. Crentz, A. L. Bailey, and J. W. Miller. 1951. 17 pp., 17 figs. Fifth in a series on preparation characteristics of coal reserves, report deals with upgrading

Reports of Investigations

- to metallurgical standards of the large reserves of coal remaining in Westmoreland County.
- †RI 4824. The Flammability Characteristics of the C<sub>6</sub>H<sub>6</sub>-Aromatic Series, by M. G. Zabetakis, G. S. Scott, and G. W. Jones. 1951. 9 pp., 10 figs. Gives data on the limits of flammability and the ignition temperatures of eight aromatic hydrocarbons (benzene, toluene, ethyl benzene, o-xylene, m-xylene, p-xylene, cumene, and p-cymene) of industrial importance because of their use as raw materials for many chemicals and describes apparatus and methods used in studying their flammability characteristics.
- RI 4825. Properties of Colorado Oil Shale, by K. E. Stanfield, I. C. Frost, W. S. McAuley, and H. N. Smith. 1951. 27 pp., 9 figs. Presents results of an analytical study made on two series of oil shale from the Mahogany ledge of the Green River formation near Rifle, Colo. This study, begun in 1945, was undertaken to determine the character of the various grades of oil shale that are being mined and processed into shale oil and refined products at Bureau of Mines Oil-Shale Demonstration Plant at Rifle, Colo., and was part of a synthetic liquid fuels program being conducted at Petroleum and Oil-Shale Experiment Station, Laramie, Wyo.
- RI 4826. Zirconium-Titanium System: Constitution Diagram and Properties, by Earl T. Hayes, A. H. Roberson, and O. G. Paasche. 1951. 11 pp., 8 figs. The investigations presented in this paper deal with alloys produced by melting briquetted mixtures of titanium and zirconium sponge in a graphite crucible, under vacuum (0.1 micron or better), or by arc melting in a water-cooled copper crucible in a helium atmosphere. The starting materials were from normal production runs and represent compositions of typical commercial metal produced by the magnesium-reduction method.
- RI 4827. Investigation of High-Alumina Clays and Bauxite of Northeastern Mississippi, by Donald F. Reed. 1952. 84 pp., 11 figs. In 1941, 1942, and 1943 Bureau investigated high-alumina clays and bauxite deposits in nine areas in northeastern Mississippi. Eighty-four holes, aggregating 2,585.8 feet of bore, were auger bored, and 109 holes, aggregating 6,658.4 feet of bore, were core drilled. Analyses were made on 409 samples.
- RI 4828. Investigation of Kasma Creek Copper Prospect, Lake Kontrashibuna, Lake Clark region, Alaska, by R. S. Warfield and F. A. Rutledge. 1951. 10 pp., 5 figs. In 1948 and 1949 Bureau investigated the Kasma Creek copper prospect. Four hundred and seventeen channel samples were taken from the bottoms of hand-dug trenches totaling 1,225 feet.
- RI 4829. Nodulization and Pelletization of Fluorite Flotation Concentrates, by H. Kenworthy. 1951. 13 pp., 8 figs. Objectives of investigation were to study nodule- and pellet-making methods and evaluate some binders that would provide technical data and furnish possible outlets for a future, larger percentage production of finely divided metallurgical fluor-spar, chiefly in the form of flotation concentrates.
- RI 4830. National Annual Diesel-Fuel Survey, 1951, by O. C. Blade. 1951. 12 pp., 1 fig. Second in a series of national diesel-fuel surveys issued by Bureau in cooperation with American Petroleum Institute. Survey gives data on 303 samples of diesel fuel contributed to Bureau by 49 companies who reported their tests on their own products, including the class or classes of service for which the fuels are recommended. In some instances, a fuel has been designated for use only in winter or summer.
- RI 4831. A Survey of Oil Production in Oklahoma by Water Flooding. Part I. Nowata, Rogers, and Craig Counties, by John P. Powell and Kenneth H. Johnston. 1952. 160 pp., 33 figs. Nowata, Rogers, and Craig Counties, Okla., accounted for more than 86 percent of the oil recovered between 1931 and 1949 in the State by means of water-flooding projects in partly depleted oil fields, according to this publication describing water-flooding operations in these three counties. This report, with RI 4832, supplements the information contained in RI 3728, History of Water Flooding of Oil Sands in Oklahoma, issued in 1943, by describing water-flooding operations in the State from July 1, 1942, to December 31, 1949. RI 3728 described water-flooding operations in Oklahoma to July 1, 1942. Work done in cooperation with State of Oklahoma.
- RI 4832. A Survey of Oil Production in Oklahoma by Water Flooding. Part II. Counties Other Than Nowata, Rogers, and Craig, by John P. Powell and Kenneth H. Johnston. 1951. 142 pp., 68 figs. Describes water-flooding operations for recovering oil in 22 counties in Oklahoma. Report, with RI 4831, supplements information contained in RI 3728, History of Water Flooding of Oil Sands in Oklahoma, published in 1943, by describing water-flooding operations in the State from July 1, 1942, to December 31, 1949. RI 3728 described water-flooding operations in Oklahoma to July 1, 1942. Work done in cooperation with State of Oklahoma.
- †RI 4833. Static Electricity in Hospital Operating Suites: Direct and Related Hazards and Pertinent Remedies, by P. G. Guest, V. W. Sikora, and Bernard Lewis. 1952. 64 pp., 15 figs. Describes simple and practical methods for preventing accumulations of static electricity in hospital operating and delivery rooms, thus lessening the chances of anesthetic explosions. (See B 520.)
- RI 4834. Preparation Characteristics of Coal From Somerset County, Pa., by William L. Crentz, A. L. Bailey, and J. W. Miller. 1951. 23 pp., 15 figs. Sixth in a series on preparation characteristics of coal reserves, report deals with upgrading to metallurgical standards of the large reserves of coal remaining in Somerset County.
- RI 4835. Explosive Characteristics of Titanium, Zirconium, Thorium, Uranium, and Their Hydrides, by Irving Hartmann, John Nagy, and Murray Jacobson. 1951. 16 pp., 17 figs. Summarizes results of study, major part of which was made in cooperation with Atomic Energy Commission, on explosive properties of metal powders. Tests were made on 22 samples of titanium, zirconium, thorium, uranium, and hydrides of these metals.
- RI 4836. Water Infusion of Coal Pillars Before Mining, Kenilworth Mine, Independent Coal & Coke Co., Kenilworth, Utah, by E. O. Jackson and W. M. Merritts. 1951. 25 pp., 19 figs. Dust hazards in a western coal mine were decreased 70 to 90 percent by drilling holes in coal pillars and forcing water through those holes into the cracks and crevices of the bed several days before actual mining started. Results of tests of this method of dust control, known as water infusion, conducted in cooperation with Independent Coal & Coke Co., at the Kenilworth coal mine, are given.
- †RI 4837. Removal of Magnesium and Magnesium Chloride From Titanium Sponge by Vacuum Distillation, by M. A. Cook and F. S. Wartman. 1952. 17 pp., 1 fig. Describes the vacuum-distillation process of removing magnesium and magnesium chloride from titanium sponge, the equipment used, loading, heating, and unloading.
- RI 4838. Bituminous-Coal Deposits in the Vicinity of Eeka, Matanuska Valley Coal Field, Alaska, by Theodore R. Jolley, Albert L. Toenges, and Louis A. Turnbull. 1952. 87 pp., 21 figs. The estimated recoverable reserves of bituminous coal in the Eeka Creek area in the Matanuska Valley coal field are 1,673,800 tons. As most of the area is broken up

†Out of print.

- by faults into several small deposits, mining these small areas is not favorable for low-cost mining.
- RI 4839. Flammability of Mixtures of Individual Paraffin-Hydrocarbon Gases With Air and Added Nitrogen at Subatmospheric Pressures, by G. S. Scott, M. G. Zabetakis, and A. L. Furno, 1952. 12 pp., 13 figs. Gives results of about 900 tests made to determine the flammability of the lighter paraffin hydrocarbons mixed with air and nitrogen at pressures of 400, 200, 100, and 70 mm. Hg. The gases tested include natural gas, methane, ethane, propane, normal butane, and isobutane. The minimum pressures at which these gases are capable of propagating flame when individually mixed with air also were investigated.
- RI 4840. Estimate of Known Recoverable Reserves of Coking Coal in Jefferson County, Pa., by James J. Dowd, Albert L. Toenges, R. F. Abernethy, and D. A. Reynolds. 1952. 18 pp., 5 figs. Known reserves of coking coal in Jefferson County are estimated at 709,732,000 short tons, and known recoverable reserves 28 inches and more thick are estimated at 251,893,000 short tons. Report includes a table of estimated reserves as of January 1, 1950, for each of the coal beds.
- RI 4841. Beneficiation of High-Iron Arkansas Bauxite Ore, by W. A. Calhoun, H. E. Powell, and J. F. Hodshire. 1952. 12 pp. Describes new process for beneficiating Arkansas bauxite ores that have a high iron content and contains detailed data of tests made with four high-iron bauxite samples. New process offers recoveries of alumina not possible in present industrial practice and should be of great value in permitting exploitation of high-iron bauxite deposits not now considered of economic value.
- RI 4842. Effects of Water Flooding On Reservoir Temperatures and Wax Precipitation in the Bradford, Pa., Oil Field, by Allyn T. Sayre, Jr., and Wm. T. Wertman. 1952. 34 pp., 16 figs. Presents results of studies of reservoir and wax-precipitation temperatures relating to wax deposition in the reservoir of the Bradford oil field.
- RI 4843. Process for Recovering Gold and Silver From Activated Carbon by Leaching and Electrolysis, by J. B. Zadra, A. L. Engel, and H. J. Heinen. 1952. 32 pp., 7 figs. Describes a commercially feasible process developed by Bureau for recovering gold and silver from activated carbon.
- RI 4844. Concentration of Oxide Manganese Ore From Doyle-Smith Claims, Northern Yuma County, Ariz., by A. O. Ipsen and H. L. Gibbs. 1952. 6 pp. Describes laboratory tests made to determine amenability of manganese ore from Doyle-Smith claims to standard ore-dressing methods of concentration to produce a marketable-grade product.
- RI 4845. Beneficiation of Oxide Manganese Ores From Arapahoe, Douglas, Saguache, Custer, Chaffee, and Park Counties, Colo., by R. R. Wells, K. C. Vincent, and T. F. Mitchell. 1952. 16 pp. Describes tests on manganese-ore samples taken from deposits in Arapahoe, Douglas, Saguache, Custer, Chaffee, and Park Counties. Manganese recovery from all but the Chaffee County deposit exceeded 65 percent.
- RI 4846. Concentration of Oxide Manganese Ores From San Bernardino County, Calif., by W. W. Agey, S. J. Hussey, and W. J. Long. 1952. 14 pp. Gives results of tests to determine whether manganese ore from four properties in San Bernardino County can be concentrated by ore-dressing methods.
- RI 4847. Manganese Concentrates From Open-Hearth Slags by Lime-Clinkering (Sylvester) Process, by John A. Ruppert. 1952. 26 pp., 4 figs. Describes investigation of a process for recovering manganese from open-hearth slags.
- RI 4848. Concentration of Oxide Manganese Ores From Vicinity of Winkelman, Pinal County, Ariz., by K. C. Dean, H. D. Snedden, and W. W. Agey. 1952. 21 pp. Describes tests on manganese ore from six properties in Pinal County. Results of tests showed that some of the deposits contained ore from which a marketable concentrate could be made.
- RI 4849. Concentration of Oxide and Silicate Manganese Ores From Siskiyou and Mendocino Counties, Northern California, by G. M. Potter, W. G. Sandell, and K. C. Vincent. 1952. 14 pp. Describes laboratory tests made on manganese ore samples collected from four properties in Siskiyou and Mendocino Counties.
- RI 4850. Copper Giant Deposits, Pima County, Ariz., by T. M. Romslo and C. S. Robinson. 1952. 9 pp., 5 figs. Gives results of an investigation of the Copper Giant deposits. Two holes, totaling 1,542 feet, were diamond drilled.
- RI 4851. Mineral-Dressing Investigation of Titanium Ore From the Christy Property, Hot Spring County, Ark., by M. M. Fine and D. W. Frommer. 1952. 7 pp. Gives results of a mineral-dressing investigation of titanium ore, conducted by Bureau as part of its program of finding new methods for utilizing medium- and low-grade ores, from the Christy property.
- RI 4852. Diamond Drilling the Gypsum-Camel Prospect, Iyoukeen Cove, Chichagof Island, Southeastern Alaska, by G. D. Jermain and F. A. Rutledge. 1952. 6 pp., 6 figs. In 1948 Bureau investigated the Gypsum-Camel prospect by cleaning out and sampling the old underground workings and diamond drilling from the surface to ascertain the lateral extensions of the gypsum deposit.
- RI 4853. Diamond Orientation in Diamond Bits. 2. A method of Identifying Hard Vectors for Setting Purposes, by Albert E. Long and C. B. Slawson. 1952. 6 pp., 11 figs., 11 pls. Presents information that will help individuals without previous training in crystallography to learn to recognize the special features of the surfaces of diamond crystals that are definite guides to the location of the various hard directions of the stones and to install them in drill bits to obtain top efficiency. Anyone equipped with a magnifying lens can find and recognize these simple characteristics of diamond crystals. (See also RI 4800.)
- RI 4854. National Motor-Gasoline Survey, Summer 1951, by O. C. Blade. 1952. 24 pp., 3 figs. Octane ratings of regular- and premium-price gasolines sold at filling stations in the United States during the summer of 1951 decreased from one-half to one octane unit from the record levels attained during winter of 1950-51. Based on tests of gasolines collected during July and August from cities in 17 marketing areas of the United States, survey included 3,427 samples obtained from service stations of 128 large and small petroleum suppliers. Work done in cooperation with the American Petroleum Institute.
- RI 4855. Beryl Resources of the Black Hills, S. Dak., by Edward L. Tullis. 1952. 19 pp., 10 figs. The Black Hills is the Nation's chief source of beryl, a rare and critical mineral found in pegmatite. The Black Hills pegmatites contain 11,824 tons of estimated beryl reserves and 234 tons of measured reserves.
- RI 4856. Knox and Yingling Fluorite Mines, Hardin County, Ill., by H. L. Burmeister. 1952. 8 pp., 6 figs. In 1949, 1950, and 1951 Bureau examined the Knox and Yingling fluorite mines. Four diamond-drill holes, aggregating 2,733 feet, were drilled.

Reports of Investigations

- RI 4857. Investigation of Encampment Vermiculite Deposits, Carbon County, Wyo., by W. A. Young. 1952. 15 pp., 9 figs. In 1949 Bureau investigated the Encampment vermiculite deposits by surface trenching, diamond drilling, and sampling. Eighty-one bulk samples were obtained from the 4 trenches, and 130 sludge samples were collected from the diamond-drill holes.
- RI 4858. Electrical Conductivity and Density of Fused Binary Mixtures of Magnesium Chloride and Other Chlorides, by R. W. Huber, E. V. Potter, and H. W. St. Clair. 1952. 14 pp., 9 figs. Gives results of a study of electrical conductivity and density of fused mixtures of five chlorides to facilitate an investigation of electrolytic reduction of magnesium oxide.
- RI 4859. Investigation of Manganese Carbonate and Wad Deposits in the Batesville Manganese District, Arkansas, by F. A. Rutledge, W. A. Tessmer, Harold B. Ewoldt, Charles R. L. Oder, M. J. Langley, and James E. Bell. 1952. 180 pp., 20 figs. Gives results of an investigation of manganese carbonate and wad deposits in the Batesville manganese district, one of the most important sources of manganese ore and ferruginous manganese ore in the United States. From August 1940 to June 1941, trenching, test pitting, shaft sinking, driving adits, and sampling were done at the Ozark, Chinn, Engels Cut, Martin, and Manganese Cave mines. From February 1941 to January 1942, churn-drill holes, bucket-drill holes, and test shafts were put down and sampled at 10 separate sites—Napoleon Hill; Perrin; Chinn; Scheleper Springs; Shaw Hill; Bell Hill; Aydelotte; Bill Jim, Hunt Hollow, and Wildcat; Hawkins; and Section 16.
- RI 4860. Diamond Drilling at Torpedo Copper Mine, Organ Mining District, Dona Ana County, N. Mex., by John H. Soule. 1952. 21 pp., 4 figs. In 1949 and 1950 Bureau investigated the Torpedo copper mine by diamond drilling, using special equipment and techniques to obtain better core recovery. Four holes, totaling 2,140.5 feet, were diamond drilled with a Government-owned hydraulic-feed drill with some special rods and core barrels in addition to the usual equipment.
- RI 4861. Electrolytic Manganese Tests in Cooperation With Industry, by Frederick Sillers, Jr. 1952. 81 pp. Electrolytic manganese from low-grade domestic ores can be substituted satisfactorily for some uses of ferromanganese made from high-grade foreign ores, according to this report. Results of tests made in cooperation with industry with electrolytic manganese developed by the Bureau are summarized.
- RI 4862. Bumpus Pegmatite Deposit, Oxford County, Maine, by G. L. Neumann. 1952. 15 pp., 6 figs. After a survey of the New England pegmatites by Bureau in 1949, the Bumpus quarry in Oxford County was selected for a diamond-drill exploratory-development project to supply information for developing more economical mining methods and for increasing production of beryl and other scarce minerals associated with pegmatitic intrusives. Seven holes, diamond drilled in 1950, showed that the pegmatite dike is continuous.
- RI 4863. Recovery of Lithium From Spodumene-Amblygonite Mixtures, by L. H. Kalenowski and S. M. Runke. 1952. 5 pp. One of a series on the utilization of the pegmatite minerals of the Black Hills area of South Dakota, report describes a new process developed by the Bureau for extracting lithium sulfate from 2 of its 4 major sources simultaneously.
- RI 4864. Development of a Rotary Test Drill, by Fred D. Wright and Lewis H. Brakel. 1952. 8 pp., 5 figs. Experience gained during operation in the Experimental Oil-Shale mine at Rifle, Colo., of a hydraulically operated drill designed by Bureau engineers has shown that rotary drilling of vertical blast holes in oil shale is less expensive than percussion drilling, according to this report describing the construction and performance of a rotary test drill.
- †RI 4865. Synthetic Liquid Fuels. Annual Report of the Secretary of the Interior for 1951. Part I. Oil From Coal. 1952. 83 pp., 61 figs. Deals primarily with progress made in producing synthetic liquid fuels from coal. Includes bibliography.
- †RI 4866. Synthetic Liquid Fuels. Annual Report of the Secretary of the Interior for 1951. Part II. Oil from Oil Shale. 1952. 86 pp., 61 figs. Deals primarily with progress made in producing synthetic liquid fuels from oil shale. Includes bibliography.
- †RI 4867. Treatment Tests of Scheelite Ores and Tailings, by A. L. Engel. 1952. 11 pp. Gives results of six preliminary tests made to assist in establishing satisfactory methods for treating scheelite (tungsten) ores and tailings for small-scale concentrator operations.
- RI 4868. Experiments on Multiple Short-Delay Blasting of Coal (in Two Parts). Part I, by Irving Hartmann, John Nagy, and H. C. Howarth. 1952. 16 pp., 6 figs. In 1949 a study was undertaken in Bureau of Mines Experimental coal mine near Pittsburgh, Pa., to investigate conditions under which simultaneous multiple and short-delay multiple blasting of coal may be used without danger of igniting gas or coal dust in coal mines and to study the vibrations of the mine roof during such blasting. Results of blasting and roof-vibration tests are given. Paper presented at Sixth International Conference of Directors of Safety in Mines Research at the laboratories of the Charbonnages de France, Verneuil (Oise) France, July 24-29, 1950. (See also RI 4875.)
- RI 4869. Investigation of the Colorado Copper Co. properties, Mesa, and Montrose Counties, Colo., by R. W. Holmes and C. M. Harrer. 1952. 11 pp., 7 figs. In 1942 and 1945 the Bureau developed five copper properties of the Colorado Copper Co. in Sinbad Valley, Mesa and Montrose Counties, by surface trenching, rehabilitation of several adits, and channel sampling. Two hundred and four samples were taken for assay from surface and underground workings.
- RI 4870. Some Thermodynamic Values for Ferrous Oxide, by G. L. Humphrey, E. G. King, and K. K. Kelley. 1952. 16 pp., 1 fig. Reports new experimental data on the heat of formation of ferrous oxide by two methods (combustion calorimetry and solution calorimetry), employing material of unequivocal composition. Results are compared with values obtained from data for the hydrogen reduction, carbon monoxide reduction, and disproportionation reactions of ferrous oxide, and a best value is selected.
- RI 4871. Separation and Utilization Studies of Bitumens From Bituminous Sandstones of the Vernal and Sunnyside, Utah, Deposits: Part I. Laboratory Hot-Water Separation Tests, by G. B. Shea and R. V. Higgins. Part II. Analytical Data on Asphalt Properties and Cracked Products of the Separated Bitumens, by W. J. Wenger, R. L. Hubbard, and M. L. Whisman. 1952. 28 pp. Tests on bituminous sandstone from two large deposits in Utah gave promise that most of the bitumen, a heavy crude oil, could be recovered and then processed successfully into gasoline and other fuels. Part I summarizes general characteristics of Vernal and Sunnyside deposits and discusses hot-water separation process as applied to these bituminous sandstones and results obtained. Part II presents analytical data which indicate possible uses for the products. Work on part II was done in cooperation with University of Wyoming.

†Out of print.