Annotated Bibliography and Index Map of Barite Deposits in United States

GEOLOGICAL SURVEY BULLETIN 1019-C

Annotated Bibliography and Index Map of Barite Deposits in United States

By BASIL G. DEAN *and* DONALD A. BROBST

A CONTRIBUTION TO BIBLIOGRAPHY OF MINERAL RESOURCES

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ANNOTATED BIBLIOGRAPHY AND INDEX MAP OF BARITE DEPOSITS IN THE UNITED STATES

By Basil G. Dean and Donald A. Brobst

INTRODUCTION

Barite is now ranked as an important non-metallic mineral commodity because of its extensive use in weighting drilling muds and concrete aggregate, in the chemical industry, and in the manufacture of paint, glass, and rubber. According to the U. S. Bureau of Mines, about one million short tons of barite was produced in the United States during 1952. Imports in 1952 totaled three hundred thousand short tons. The United States is the world's leading producer and consumer of barite.

Missouri, Tennessee, and Georgia have been the major sources of barite since mining began there in 1872, 1902, and 1914 respectively. Deposits in Arkansas, Arizona, Idaho, Montana, Nevada, and New Mexico have been developed extensively in recent years. Deposits in Connecticut, Maryland, and Pennsylvania have not been worked for many years, and no production has been recorded from Kentucky since 1926. Deposits in Alabama, Colorado, Illinois, Virginia, and Wisconsin were not mined during 1953, although they were worked between 1923 and 1948. Most of the deposits in California have been worked between 1923 and 1948.

EXPLANATION OF THE ANNOTATED BIBLIOGRAPHY

The work of compiling the preliminary copy of the annotations of the literature cited was done by Basil G. Dean in 1952–53. The material was assembled, brought up to date, and prepared for publication by Donald A. Brobst in 1953–54. The annotated references are listed by authors in alphabetical order. The entries are cross-indexed by two other lists including general references and state references.

The general references, numbered to correspond with the alphabetical list of authors, include general information on occurrence, origin, production, mining and treatment of ore, as well as some descriptions of deposits that are distributed over large areas involving several states.

State references describe deposits and mining and milling techniques practiced within a particular state. The index by state consists of two parts: a list of general papers arranged by number; a numbered list of districts, mines, and prospects in the state arranged alphabetically. The number for each deposit corresponds to the number of that deposit on the accompanying index map. Letter symbols describing the type of deposit used on the map are repeated in the text; the symbols are explained on the map. The numbers to the right of the names of the deposits correspond to the numbers of the reports in the author index that describe the given deposit.

In a few instances, two references containing essentially the same information have been included for the convenience of the reader who may have access to only one of the references. Some older references which have been superseded by more recent ones have been omitted.

EXPLANATION OF THE INDEX MAP

The index map (Plate 1) gives the location, type of geologic occurrence, and relative production from barite deposits in the United States. The deposits are numbered consecutively in each State on the map; this order is the same as in the list of deposits placed in the State index.

The deposits are classified on the map according to the mode of occurrence as residual (r), bedded or lenticular replacements (b), veins, tabular ore bodies or mineralized breccia zones (v), and other occurrences including disseminated deposits and circle deposits (o). Circle deposits are bell- or cone-shaped masses of lightly brecciated country rock which have been mineralized with barite and small amounts of galena, sphalerite, chalcopyrite, and calcite. Deposits not described in the literature as to type are indicated by a question mark (?).

The symbol for the type of occurrence refers to that part of the deposit which is commercially exploitable, although other types of occurrences may be in the vicinity. In the Cartersville district, Georgia, the deposits are listed as residual because nearly all of the production has been from residual deposits in clay, although the primary deposits of barite occur in noncommercial veins in the bedrock. If more than one type of occurrence is of commercial value, as in the Central district, Missouri, symbols are combined, with the most important type listed first.

Deposits are indicated as either prospects or mines. Prospects include all undeveloped deposits for which there is no record in the literature of production of barite and the large ore bodies which contain barite as a major gangue constituent. Commercially exploited deposits of barite are associated chiefly with other non-metallic minerals in bedrock and residual clay. Deposits of only mineralogic interest have been omitted.

Production from individual mines or districts is classed as small if the estimated total production has been less than 5,000 tons, and as large if the estimated total production has been more than 5,000 tons. These estimates of production are based largely on incomplete information in the literature cited.

The active or inactive status of mines has not been shown on the index map, for it changes with economic and other conditions. Some barite mines and prospects have not been indicated on the map because of the scale or because of inadequate information in the literature. Some recent discoveries and mining developments, particularly in Nevada, have not been described in the literature as of September 1954.

ANNOTATED BIBLIOGRAPHY

[Numbers refer to author index, p. 152–186]

GENERAL REFERENCES

39, 42, 53, 54, 55, 57, 65, 74, 80, 84, 99, 105, 113,114, 115, 120, 134, 135, 136, 143, 148.

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2. r Beaver Creek Valley, St. Clair County and Greens Valley, Etowah County: 2, 102, 118.
3. r Leeds, Jefferson County: 2, 102.
4. r Longview-Saginaw district, Shelby County: 2, 102.
5. r Sinks district, Bibb County: 2, 28, 54, 67, 74, 102, 118, 143.
6. v Southeastern corner, Cherokee County: 1, 2, 54, 74, 102.
7. v Southern Cleburne County: 1, 2, 54, 74, 102.
8. r Vincent-Harpersville-Wilsonville district, Shelby County: 2, 54, 102.

ARIZONA

General: 4, 8, 13, 43, 85, 149, 150, 158.

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2. v Castle Dome district, Yuma County: 43, 149.
3. v Ernest Hall Property, Yuma County: 151.
4. v McCracken Lead mine, Mohave County: 13.
5. v Nottbusch mine (Neversweat district), Yuma County: 149.
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3. b Boone Springs Creek, Fancy Hill, Gap Mountain, Polk Creek Mountain, and Sulphur Mountain prospects, Montgomery County: 66, 89, 93, 120.
4. b Cossatot River prospect, Polk County: 66, 93.
5. b Magnet Cove district, Hot Spring County: 21, 39, 53, 54, 69, 80, 88, 93, 97, 103, 104, 148.
6. b Mill Creek prospect, Pike County and Pigeon Roost Mountain deposit, Montgomery County: 66, 93.
7. b Viles Creek prospect, Polk County: 66, 93.

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2. b Almanor district (Cameron, Savercool, and Synthetic Iron Color Co. mines), Plumas County: 11, 23, 63, 95, 125, 152, 157.
3. ? Barite No. 1 and No. 2 claims (Noble prospect on Beegum Creek), Shasta County: 10, 19, 20, 152, 154.
4. v Barstow area (Ball, Barium Queen, Big Medicine, Lead Mountain and Silver Spar mines), San Bernardino County: 19, 32, 56, 95, 152, 155, 157.
5. v Bidwell Ranch prospect and Exposed Treasure No. 1 and No. 2 claims, Shasta County: 10, 19, 20, 95.
6. ? Democrat barite mine, Nevada County: 19, 20, 86, 95, 152.
7. b El Portal and Egenhoff mines, Mariposa County: 11, 19, 20, 23, 40, 52, 53, 54, 63, 68, 80, 95, 113, 114, 148, 152.
8. b Gabilan (Fremont) Peak deposit, Monterey County: 19, 20, 152.
9. b Glidden Co. (Loftus) deposit, Shasta County: 10, 19, 20, 95, 152.
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11. v Hansen barite mine, San Bernardino County: 19, 56, 95, 152, 155.
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13. v Liscom Hill deposit, Humboldt County: 19, 20, 95.
14. v Mountain Pass deposits, San Bernardino County: 26, 117, 155, 160.
15. v Poso baryta deposit, Tulare County: 56, 95, 130, 152.
16. v Red Hill deposit, Orange County: 19, 20, 95, 152.
17. b San Dimos Canyon deposit, Los Angeles County: 19, 20, 95, 152.
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2. v Ilse area (Feldspar, School Section, and other mines), Custer County: 7, 44, 81, 140.

3. ? Little Maude mine, Fremont County: 7.
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General: 25, 28, 59, 61, 72, 73, 75, 87, 94, 144.
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6. r Pall Mall district, Fentress County: 54, 105, 107, 147.
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General: 12, 14, 37, 156.
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2. o Henry Mills ranch deposit, Val Verde County: 14, 37.
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6. rvb Russell-Tazewell and Smyth Counties area: 33, 34, 54, 105, 113, 114, 154.

WASHINGTON

WISCONSIN

AUTHOR INDEX

1 Adams, G. I., 1931, Hydrothermal origin of the barite in Alabama: Econ. Geology, v. 26, no. 7, p. 772–776.

Small barite veins occurring in shales of the Weisner formation of Lower Cambrian age and in the pre-Cambrian Ashland mica schist, in Cherokee and Cleburne Counties are believed to have been deposited by hydrothermal solutions at the close of the Paleozoic, after formation of the main structural features of the Appalachians. The veins are 12 to 18 inches wide and not considered economic.

2 Adams, G. I., and Jones, W. B., 1940, Barite deposits of Alabama: Ala. Geol. Survey Bull. 45, 38 p.

The geologic occurrence and origin of barite are discussed, and individual mines and prospects in the nine barite-bearing localities of Alabama described. The major primary deposits occur as irregular veins and replacement bodies in the Knox dolomite of Cambrian and Ordovician age and in the Pelham limestone of Ordovician age. Barite veins also occur in shales of the Weisner formation of Lower Cambrian age and in the pre-Cambrian Ashland [mica] schist. The authors believe that these deposits were formed by mesothermal and epithermal solutions moving along fractures caused by the main deformation of the Appalachians at the close of the Paleozoic. Only residual deposits in red clay derived from weathering of the primary deposits described above have been worked. The most abundant residual deposits are found in Bibb County where barite is associated with fluorite, limonite, calcite, and native sulfur. These deposits are believed by Adams and Jones to offer the best possibilities in the state for mining development. Barite was first produced in 1914; production reached a peak in 1917 and then gradually declined until 1925. Since 1925, production has been intermittent and on a small scale.

3 Agnew, Allen F., Flint, Arthur E., Crumpton, R. P., 1954, Geology and zinc-lead-barite deposits in the area east of Cuba City, Wisconsin: U. S. Geol. Survey Map MF 15.

A detailed map (scale 1:12,000) shows the geology of the ore deposits east of Cuba City. A marginal text briefly describes the history of the district, the rock units and thin alteration, the structure, and the ore deposits.

4 Allen, M. A., and Butler, G. M., 1919, Barytes: Univ. Bur. Mines Bull. 99, 18 p.

A general discussion of barite is followed by brief notes on occurrences of barite in Arizona. All known deposits, which occur in veins in igneous or

sedimentary rocks, are small and most veins are less than three feet wide. It is doubtful that many would be of commercial value, even if they were near a market.

5 Anderson, A. L., 1943, The antimony and fluorspar deposits near Meyers Cove, Lemhi County, Idaho: Idaho Bur. Mines and Geology Pamph. 62, p. 1, 11, 14–16.

A mineralized fracture zone as much as 20 feet wide in silicic tuff of the Challis volcanics of Oligocene [and early miocene] age contains mostly barite, with considerably less stibnite, fluorite, and chalcedony.

The stibnite content of the deposit is economically unimportant.

6 Arkansas Geological Survey, 1942, Mineral resources of Montgomery, Garland, Saline, and Pulaski Counties: County Min. Rept. 3, p. 30.

Small deposits of impure barite have been found in veins with calcite and in limonite deposits in Pulaski, Saline, Garland, and Montgomery Counties. These deposits are not of economic value. The occurrence of commercially exploited barite deposits in Hot Spring County (Magnet Cove) is noted. Additional deposits may occur in Garland County.

7 Argall, G. O., Jr., 1949, Industrial minerals of Colorado: Colo. School of Mines Quart., v. 44, no. 2, p. 32–39.

Barite occurrences in Colorado are described. A bibliography and general information on uses, treatment, and marketing of barite are included. Barite occurs as gangue in many base-metal sulfide veins of Colorado, in gold telluride veins at Cripple Creek, in ferberite veins in Boulder County, and in fluorite veins of Boulder and Mineral Counties. In a few localities, barite constitutes the main filling of the vein. Small quantities of barite were mined in Boulder, Fremont, and Custer Counties during World War I and more recently in Park and Custer Counties.

8 Arizona Department of Mineral Resources, 1945–1950, Seventh to Eleventh Annual Repts.

These annual reports contain summaries of information on barite mining in the state.

9 Averill, C. V., 1937, Mineral resources of Plumas County: Calif. Jour. Mines and Geology, v. 33, no. 2, p. 92.

Barite occurs in lenses in slate at the Savercool and Synthetic Iron Color Co. mines four miles southwest of Almanor, Plumas County. Up to 1936, about 17,000 tons of barite had been mined at the Synthetic Iron Color Co. property. The ore averaging about 94 percent $BaSO_4$ was mined in open pits and underground. At the Savercool mine, a carload of barite was mined from a barite lens 10 feet wide and shipped as a sample.

10 Averill, C. V., 1939, Mineral resources of Shasta County: Calif. Jour. Mines and Geology, v. 35, no. 2, p. 114–115.

Barite occurs in fissure veins in basic igneous rock at the Afterthought prospects, 20 miles north of Redding. The veins range from a few inches to eight feet in width and are reported to contain "quite pure" barite. Barite associated with a small amount of witherite has been exposed in a small open cut (Barite No. 1 and No. 2 claims) in the side of Beegum Creek Canyon about two miles from Platina. A narrow lens or vein of barite has been found on the Bidwell ranch just south of the town of Montgomery Creek. Several thousand tons of barite have been mined east of Castella (Loftus deposit) by the Glidden Co. for the manufacture of lithopone. The barite occurs as a bedded deposit in nearly horizontal slate and limestone of probable Devonian or Carboniferous age. The average grade of ore was nearly 93 percent $BaSO_4$; mining was from open pits.

11 Averill, C. V., and Norman, L. A., Jr., and others, 1951, Counties of California, mineral production and significant mining activities of 1949: Calif. Jour. Mines and Geology, v. 47, no. 2, p. 338 and 350.

A new barite lens was discovered by diamond drilling at the El Portal barite deposits by the National Lead Co. on the north side of the Merced River, Mariposa County. The company planned to explore the lens with a crosscut and raise in 1950. Colored barite occurs in a lens six feet wide in slate at the Cameron barite mine three miles south of the Almanor Dam, Plumas County. The deposit was mined from an open cut in April and May of 1949.

12 Baker, C. L., 1932, Barite in Texas: Texas Univ. Bur. Econ. Geology Min. Res. Circ. 4, 5 p.; 1934, The geology of Texas, v. 2, Structural and economic geology: Texas Univ. Bull. 3401, p. 403–409.

This paper is largely a general discussion of properties, occurrence, production, mining, preparation and uses of barite. Barite occurrences in Texas are briefly described. The barite commonly occurs in small veins or nodules in sedimentary rocks. No production had been recorded from Texas as of 1932.

13 Bancroft, Howland, 1911, Reconnaissance of the ore deposits in northern Yuma County, Arizona: U. S. Geol. Survey Bull. 451, p. 123–126.

At the McCracken lead mine in southern Mohave County barite is reported in large quantities in two fissure veins which range in width from 6 to 20 feet. In addition to barite, the vein filling consists of quartz, calcite, siderite, dolomite, and galena.

14 Barnes, V. E., 1939, Additional notes on barite: Texas Univ. Bur. Econ. Geology Min. Res. Circ. 11, 4 p.

Three small barite deposits in northeastern Gillespie County, northern Llano County, and near Pandale, Val Verde County are described. Deposits at the first two localities are small veins in pre-Cambrian schist and gneiss. The veins contain impure barite associated chiefly with quartz. Barite occurs near Pandale as cavern fillings in cherty limestone. None of the deposits appears to be large enough to be of economic value.

15 Bastin, E. S., 1931, The fluorspar deposits of Hardin and Pope counties, Illinois: Ill. State Geol. Survey Bull. 58, p. 30–31 and 57.

Barite occurs sporadically near the surface where it coats and replaces fluorite in both the vein and blanket-type deposits. The fluorite is considered of hydrothermal origin, but the barite was probably deposited by circulating ground water. The barite is generally not of commercial importance, but it might be recovered as a by-product in mining the fluorspar deposits of the blanket type.

16 Bishop, O. M., 1949, The mineral industry of Missouri in 1946 and 1947 with total production summarized: Mo. Geol. Survey and Water Res. Inf. Circ. 4, p. 8–13.

Uses of barite, types of occurrences, production, and mining and milling methods in Missouri are summarized. Annual production and value of barite produced in Missouri from 1872 through 1947 is tabulated. Barite mining began in pre-Civil War days and has been continuous since 1872, with a total recorded production to 1947 of 4,765,125 tons valued at $31,774,237. Missouri has produced more barite than any other state.

17 Bishop, O. M., 1950, The mineral industry of Missouri in 1948: Mo. Geol. Survey and Water Res. Inf. Circ. 6, p. 6–7.

Barite production in Missouri in 1948 is discussed. In 1948 this totalled 278,071 tons of barite valued at $2,413,802.

18 Bishop, O. M., 1951, The mineral industry of Missouri in 1949: Mo. Geol. Survey and Water Res. Inf. Circ. 7, p. 6–7.

Competition from producers at Magnet Cove, Ark., caused a decline in barite production in Missouri in 1949. Of the total production of 186,891 tons, approximately 78,800 tons were ground for use in drilling muds and 83,300 tons were shipped to the chemical industry. The remaining 25,000 tons was added to stockpiles. All but 3,540 tons was mined in Washington County from residual clays having an average content of 10 percent barite.

19 Bradley, W. W., 1930, Barite in California: Rept. 26 of the State Mineralogist, v. 26, no. 1, p. 45–57.

The occurrence and uses of barite in the United States are discussed. Principal barite deposits in California are described by counties. By 1929 production of barite had been reported from Inyo, Los Angeles, Mariposa, Monterey, Nevada, Orange, San Bernardino, Santa Barbara, and Shasta Counties. Commercial production of barite in California began in 1910 and with the exception of 1924 and 1925 some production has been recorded each year since then reaching a total of 86,768 tons at the end of 1929. California barite resources in 1929 were considered ample to meet any considerable increase in Pacific Coast market demands. This is the most complete summary available about deposits of barite in California.

20 Bradley, W. W., 1930, Barite in California: Am. Inst. Min. Metall. Engineers. Tech. Pub. 266, 9 p.

Same material as in reference 19 but presented in a slightly condensed version.

21 Branner, G. C., 1931, Barite in Arkansas: Eng. and Min. Jour., v. 131, no. 11, p. 512.

The results of prospecting the large Magnet Cove barite deposit during 1930 and 1931 are summarized. The material reviewed here is covered in detail by Norman and Lindsey (1941).

22 Branner, G. C., and others, 1940, Polk County: Ark. Geol. Survey County Mineral Rept. 1, p. 18–19 and pl. 7.

The occurrence of six small barite deposits in central Polk County is noted. The barite occurs in thin veins in the Missouri Mountain slate of Silurian age and in small pockets and seams in the overlying Arkansas novaculite of Devonian and Mississippian age. The deposits appear to be too small to be of economic value. Location of deposits is shown on geologic map of Polk County.

23 Braun, L. T., 1950, Barite, *in* Jenkins, O. P., and others, Mineral commodities of California: Calif. Dept. Nat. Res. Div. Mines Bull. 156, p. 130–132.

Occurrences, production, uses, and markets for barite in California are discussed briefly. Occurrences of barite, chiefly as veins or replacements, are widespread and a total production of more than 500,000 tons from several deposits was recorded between 1910 and 1949. Recent production has been from two properties, a replacement deposit near El Portal, Mariposa County (the principal source) and from a lens near Greenville, Plumas County. California barite is used principally for drilling mud.

24 Buckley, E. R., 1909, Geology of the disseminated lead deposits of St. Francois and Washington Counties: Mo. Bur. Geology and Mines, v. 9, pt. 1, p. 223–228 and 238–248.

Lead deposits of southeastern Missouri contain barite associated with galena and other sulfides, sulfates, and carbonates. They occur in irregular vertical and horizontal openings in dolomite and in residual clay derived from dolomite. Barite is most abundant in the Potosi dolomite (Cambrian). The barium is believed to have been carried in solution as $BaCO_3$ in groundwater and precipated in solution cavities by reaction with solutions of an alkaline sulfate, probably $CaSO_4$. The barium probably was derived originally from the feldspars of igneous rocks from which the sediments of the area were derived. The report includes descriptions and a map indicating the location of 33 barite deposits which were being or had been worked in the area as of 1909.

25 Butts, Charles, and Gildersleeve, Benjamin, 1948, Geology and mineral resources of the Paleozoic area in northwest Georgia: Ga. Geol. Survey Bull. 54, p. 83–85.

Although barite is widely distributed in northwest Georgia, important deposits are essentially limited to the Cartersville district. Six other isolated barite localities lie within a belt about 75 miles long and as much as 25 miles wide which extends northeast from the vicinity of Esom Hill, Polk County to Ruralvale in Whitfield County. The principal producers of crude barite in the past three years are listed in a table. The locations of active barite operations in 1946 are indicated on a mineral resource map. Reserves are believed sufficient for many years of continued production.

26 California State Mining Bureau, 1910–1948, Mineral production of California: Calif. State Min. Bur. Ann. Bulls. 1910–37; Calif. Dept. Nat. Res. Div. Mines Ann. Bulls. 1938–48.

In this annual publication of the Division of Mines, yearly production of barite by counties in California is tabulated. Tables are included to show annual value and tonnage of barite produced since 1910.

27 Clippinger, D. M., 1949, Barite of New Mexico: N. Mex. Bur. Mines and Mineral Res. Circ. 21, 28 p.

All available information on barite in New Mexico up to and including 1948 is summarized. The geology, occurrence, mining, milling, and production of barite is reviewed. Nineteen mines and prospects in Dona Ana, Lincoln, Socorro, and Torrance Counties and 12 other scattered deposits are described briefly. A bibliography is included. Barite occurs chiefly as vein and breccia fillings which may be accompanied by replacement of wall rock. Country rocks include pre-Cambrian granite and schist and quartzite, limestones, and shales of Paleozoic age. The principal minerals associated with the barite are fluorite and quartz, with lesser amounts of calcite, gypsum, and sulfides. Fluorite in varying amounts is present in almost all the deposits. As a result of the recent development of milling methods for separation of barite and fluorite the recovery of both minerals from some deposits is now commercially possible. Recent demands for heavy drilling muds in the oilfields of New Mexico and west Texas have created a new market nearby.

28 Crickmay, G. W., 1935, Origin of barite in the Appalachian Valley: Econ. Geology, v. 30, no. 5, p. 563–564.

The paper by Jones and McVay (1934) in which they advocate hydrothermal origin for Alabama barite deposits is discussed. Crickmay believes that both hypogene and supergene deposition of barite occurred in the Cartersville district, Georgia and probably also in Alabama. Massive, white barite at Cartersville is commonly brecciated and Crickmay considers it of hypogene origin. Delicate transparent barite crystals called "flowers of ocher" occur in open cavities in quartzite and may have formed from the earlier veins by solution and subsequent deposition of barite from circulating surface waters.

29 Dahners, L. A., 1949, Investigation of the Del Rio and Stackhouse barite deposit, Cocke County, Tenn., and Madison County, N. C.: U. S. Bur. Mines Rept. Inv. 4571, 26 p.

The results of diamond-drilling by the U. S. Bureau of Mines during 1944 on the Moccasin Gap prospect and Krebs property in Cocke County, Tenn., and the Sandy Bottom mine of the Stackhouse group in Madison County, North Carolina are described. Tables of analyses of samples and logs of drill-holes are included. The ore is principally barite associated with fluorite, pyrite, calcite, quartz, and traces of copper. The veins cut by drill holes on the Moccasin Gap property were narrow and low grade. Ore containing 33 to 57 percent barite was intersected by one drill hole on the Krebs property, which was in operation in 1944. At the Sandy Bottom property unconsolidated vein material could not be cored and sludge samples showed only a trace of barite.

30 Dake, C. L., 1930, The geology of the Potosi and Edgehill quadrangles: Mo. Bur. Geology and Mines, 2d ser., v. 23, 233 p.

Detailed descriptions of stratigraphy, structure, and ore deposits of this area in southeastern Missouri are given. Rocks of the area include pre-Cambrian igneous rocks, chiefly rhyolite porphyry, and sedimentary rocks of Paleozoic age, chiefly dolomites. Beds in this area west of the structural center of the Ozark dome have a westerly regional dip broken by faults and porphyry knobs. Nearly half the total barite produced in the United States in 1927 was from the Washington County district, part of which lies in the Potosi quadrangle. Nearly all of the commercially important barite occurs irregularly disseminated in deep residual clays derived from the weathering of the Potosi and Eminence dolomites of Cambrian age. Silica in the form of chert, chalcedony, or quartz universally is associated with barite in the residual clay. Other minerals associated with barite in order of their decreasing abundance are limonite, galena, marcasite, and pyrite. The author suggests that barite was precipitated from sea water in minutely disseminated form in beds of the Potosi and Eminence dolomites. The barite was later concentrated into larger masses by the shallow circulation of groundwater during the weathering process which also formed the residual clay.

31 Dunlap, J. C., 1945, Structural control in the eastern belt of the Sweetwater barite district, east Tennessee (abstract): Econ. Geology, v. 40, no. 1, p. 82; Geol. Soc. America Bull., v. 56, no. 12, pt. 2, p. 1156.

The Cambrian and Ordovician sedimentary rocks lie in three parallel belts separated by major thrust faults. Barite deposits are restricted to the Beekmantown division [Ordovician] of the Knox group, and occur principally in the limestone member of the lower Kingsport formation. The regional strike of these beds is N. 50° E. and dip is 10° to 20° southeast. Two types of minor structures with axes that strike from N. 70° W. to due west cut across the regional structure. These minor structures "are (1) 'knobs' or sharp flexures caused by abrupt change in strike and (2) very gentle anticlines." Narrow brecciated zones in these minor structures are believed to have admitted rising hydrothermal solutions which spread laterally along the favorable beds in which the barite deposits now occur. These deposits form banded veins in coarse breccia and contain pyrite, fluorite, and barite listed in the order of deposition and increasing abundance. Monthly barite production of 3,400 tons in 1945 was derived entirely from residual deposits.

32 Durell, Cordell, 1954, Barite deposits near Barstow, San Bernardino County, California: Calif. Dept. Nat. Res. Div. Mines, Special Report 39, 8 p.

The geology of four barite mines and areas are briefly described: the Ball deposit, the Hansen deposit and vicinity, the deposits in the vicinity of the Barium Queen mine, deposits at the Lead Mountain mine and vicinity. Four detailed geologic maps are included.

33 Edmundson, R. S., 1936, Barite deposits of Virginia: Am. Inst. Min. Metall. Engineers Tech. Pub. 725, 17 p.

The descriptions of the individual mines are omitted from this condensed version of a later report (Edmundson, 1938). The occurrence, mineralogy, and origin of the deposits of Virginia are reviewed.

34 Edmundson, R. S., 1938, Barite deposits of Virginia: Va. Geol. Survey Bull. 53, 85 p.

The distribution, types of deposits, origin, and probable commercial value of barite deposits is discussed. Individual mines and prospects are described and a section on mining methods and prospecting is included. The deposits are in the Piedmont and Valley and Ridge provinces. Abundant small deposits of barite occur in bedrock in fissure veins, replacement masses, and in breccia zones. The most important of these deposits are lenticular replacement bodies up to 20 feet wide, 100 feet long and 150 feet thick in calcareous rocks. Breccia deposits contain thin seams of barite generally only a few inches wide. Bedrock deposits, because of their small size, are probably not of commercial value. Wall rock of these deposits includes pre-Cambrian marble, schist, and gneiss, Paleozoic limestone and dolomite, and Triassic shale, sandstone, and diabase. The author cites criteria considered indicative of an hydrothermal origin for these deposits. Residual deposits irregularly distributed in red or black clay in Grayson, Botetourt, Campbell, and Pittsylvania Counties might yield small commercial quantities of barite.

35 Emmons, W. H., 1910, A reconnaissance of some mining camps in Elko, Lander, and Eureka Counties, Nevada: U. S. Geol. Survey Bull. 408, p. 126.

At the Starr Grove mine about 15 miles southeast of Battle Mountain, barite occurs with quartz and small amounts of disseminated sulfides in a large flat ore body which lies nearly parallel to the enclosing dark gray limestone. In places "there is as much as 10 feet of nearly pure barite".

36 Espenshade, G. H., 1952, Manganese, iron, and barite deposits of the James River-Roanoke River district, Virginia: U. S. Geol. Survey Map MF 5.

A geologic map shows the location of barite deposits in the district. Barite has been found at about a dozen localities in the southern part of the district and also south of the Roanoke River in Pittsylvania County. The barite occurs in veins in white marble of Furcron's Mount Athos formation [Paleozoic(?)] and as fragments in overlying surficial and residual clays. Although the Hewitt mine is estimated to have produced about 100,000 tons of barite, most of the deposits in this district are believed to be rather small.

37 Evans, G. L., 1946, Barite deposits in Texas, *in* Sellards, E. H., and others, Texas mineral resources: Univ. Texas Pub. 4301, p. 105–111.

Deposits of barite in Texas occur in thin veins, replacement bodies, and as irregular masses in residual clay. The deposits are in rocks ranging in age from pre-Cambrian to Tertiary. Deposits in 13 counties are described. Only a few hundred tons have been mined from these deposits, many of which are too small to be of commercial value. A replacement deposit of relatively high grade barite in the limestone of the Permian Delaware Mountain formation near Seven Heart Gap, Culberson County, is described as "one of the most promising (deposits) now known in the state from the standpoint of possible commercial development". A large tonnage of low grade barite occurs as filling in limestone caverns near Pandale (Henry Mills ranch deposit), Val Verde County. This is the most complete reference on barite deposits in Texas.

38 Ferguson, H. W., and Jewell, W. B., 1951, Geology and barite deposits of the Del Rio district, Cocke County, Tennessee: Tenn. Dept. Conserv., Div. Geology Bull. 57, 235 p.

The barite deposits and geology of the district are described in detail. The district has yielded about 55,000 tons of barite from 12 mines and 5 major prospects since 1880. Geologic conditions indicate reserves of at least four times the amount already mined. The rocks include a clastic group of unknown age, a Lower Cambrian group of clastics, the Cambrian Shady dolomite and Rome formation. The principal barite deposits occur in the immediate vicinity of two prominent low angle thrust faults. High grade but comparatively small deposits of barite are found along a bedding plane fault beneath a prominent coarse-grained quartzite in the upper part of the Cambrian Unicoi formation. In these deposits white, coarsely crystalline barite, commonly containing 95 to 98 percent $BaSO_4$, occurs with ankerite in pods, stringers, and veinlets in the fault zone. Mining has been chiefly along weathered portions of the vein where lumps of barite are in reddish-brown sandy clay. Larger low grade deposits containing 60 to 90 percent $BaSO_4$ are along the Brushy Mountain thrust, a zone of intense shearing with a maximum thickness of nine feet. The sheared granulated material is usually replaced by quartz discolored by blue-black hematite. Workable ore deposits occur where barite is concentrated locally with small amounts of fluorite, hematite, pyrite, and traces of chalcopyrite.

39 Fine, M. M., and Kennedy, J. S., 1948, Investigation of ore-dressing methods for barite ores from New Mexico, Missouri, and Arkansas: U. S. Bur. Mines Rept. Inv. 4280, 31 p.

The results of laboratory beneficiation tests on barite samples from five properties are described. Barite-fluorite ore from the Palm Park claims

near Hatch, New Mexico yielded acid-grade fluorspar and drilling-mud-grade barite by flotation and gravity concentration. Recovery of 86 percent of the barite and 76.5 percent of the fluorite was accomplished by flotation. Gravity concentration yielded slightly better recovery of barite but a much poorer recovery of fluorite. Ore with an unusually high content of iron from Washington County, Missouri yielded concentrates by flotation, magnetic separation, and agglomerate tabling. These concentrates contained less than 0.1 percent iron oxide. The flotation of ore with a high content of quartz and iron from central Missouri yielded a concentrate containing 1.1 percent iron oxide, and recovered 95.2 percent of the barite. With tabling and magnetic separation, 86.2 percent of the barite was recovered in a concentrate containing only 0.7 percent iron oxide. Samples from two producing properties at Magnet Cove, Arkansas contained soluble salts detrimental to flotation. Drilling-mud-grade barite was recovered by flotation after removal of most of the soluble salts by leaching and washing.

40 Fitch, A. A., 1931, Barite and witherite from near El Portal, Mariposa County, California: Am. Mineralogist, v. 16, no. 10, p. 461–468.

The mineralogy of the barite-witherite veins and their wall rocks near El Portal, California are described. A group of north-trending replacement veins up to 20 feet wide occur in the limestone lenses of isoclinally folded Paleozoic sedimentary rocks. These rocks, dominantly argillaceous, have undergone low-grade dynamic metamorphism and local contact metamorphism near the margin of a small granite boss. The veins which terminate at the contact with the intrusive change in composition and texture as the granite is approached. This change may be correlated with the degree of contact metamorphism of the wallrock. Barite and witherite in places occur together and are associated chiefly with quartz and pyrite. As the intrusive is approached, more coarse-grained calc-silicate minerals are developed in the veins with a corresponding decrease of barite and witherite. Barite and witherite are absent from the veins adjacent to the granite. The deposits may have formed by replacement of limestone lenses "by barium solutions given off from the underlying Sierra Nevada granite batholith."

41 Fohs, F. J., 1913, Barytes deposits of Kentucky: Ky. Geol. Survey, 4th ser., v. 1, pt. 1, p. 441–588.

The geology, mineralogy, mining, milling, production, and prospecting of the barite deposits are reviewed. A general section on the uses and occurrence of barite is also included. Deposits of commercial importance are reported in the Central and Western districts and in Union County where the deposits occur in veins in Ordovician and Carboniferous sedimentary rocks. The important Central district is discussed in detail including brief descriptions of nearly 200 prospects. Barite in the Central district is associated chiefly with calcite, fluorite, sphalerite, and galena in steeply dipping veins and breccia fillings in Ordovician limestone. Replacement of the wall rocks is of minor importance. The veins and breccia fillings are irregularly shaped and average two to four feet in width and 600 feet in depth. Production from the Central district was recorded every year from 1903 to 1911; the most productive year was 1908 when 11,000 tons were mined, ranking Kentucky as the third largest producer in the United States. A small tonnage was produced in the Western district in 1903 and 1907.

42 Frommer, D. W., and Fine, M. M., 1952, Experimental treatment of barite ores from Montgomery County, Ark., and Morgan County, Mo.: U. S. Bur. Mines Rept. Inv. 4881, 11 p.

Results of ore dressing studies on samples of barite ore from two undeveloped barite deposits in Arkansas and Missouri are described. Ore from Montgomery County, Arkansas consists of barite intimately mixed with finely crystalline quartz. Ore from near Stover and Versailles, Morgan County, Missouri consists of barite with considerable dolomite, sphalerite, chert, and quartz with lesser amounts of fluorite, sulfides, and iron oxides. Ores from both areas are amenable to concentration by fine grinding and froth flotation. The Arkansas ore yields barite concentrate suitably for use in drilling muds and the Missouri ore yields both zinc concentrate and barite concentrate the latter of which is suitable for manufacture of some barium chemicals.

43 Galbraith, F. W., 1947, Minerals of Arizona: Ariz. Bur. Mines, Geol. Ser. 17, Bull. 153, p. 62.

The location of important barite occurrences in Arizona are listed by counties.

44 George, R. D., 1927, Geology and natural resources of Colorado: Univ. Colorado, Boulder, Colo., p. 162.

The occurrence of "strong veins of barite in the vicinity of Boulder and Jamestown and near South Boulder Creek in Boulder County" are reported. Several carloads have been shipped from vein deposits in Sunshine Canyon west of Boulder. Barite has also been produced from mines near Aspen.

45 Gianella, V. P., 1940, Barite deposits of northern Nevada: Am. Inst. Min. Metall. Engineers Tech. Pub. 1200, 6 p.; 1941, Trans., v. 144, p. 294–299.

Barite is widely distributed in at least nine counties. Annual production in 1938 and 1939 was over 15,000 tons and total production to the end of 1938 was 66,424 tons. Production has been principally from the northern part of Lander and Eureka Counties with a smaller amount from Elko County. The barite occurs in veins and replacement deposits. Barite in veins is generally white and is generally associated with sulfides. Most of the barite has been mined from open cuts in replacement deposits of dark barite in limestone beds of probable Carboniferous age. The deposits are believed to be of hydrothermal origin and are probably contemporaneous with some of the hydrothermal metallic ore deposits of the state. Nine principal deposits in northern Nevada are briefly described and located on an index map. This is the most complete reference available concerning barite deposits of Nevada.

46 Gildersleeve, Benjamin, 1946, Minerals and structural materials of east Tennessee: TVA Regional Products Research Div. Rept. B., p. 3–5.

In the Fall Branch district of Greene, Washington, and Sullivan Counties, workable deposits of barite occur as irregular masses in residual clays in the upper part of the Knox dolomite. The deposits are in a linear belt about 20 miles long. The deposits contain two distinct types of barite, an exceptionally pure black variety and a less pure white variety. There has been no production from the district in many years except for about 168 tons shipped in 1935. Vein deposits in lower Cambrian rocks have been worked intermittently for the past 25 years at several localities in Cocke County. A small deposit of relatively pure white barite in the residium of the basal part of the Ordovician Murfreesboro limestone on the shore of the Lost Creek area of Norris Lake was developed in 1938. Other occurrences of barite in Johnson, Carter, Sevier, Hamblen, and Hawkins Counties are reviewed briefly.

47 Gildersleeve, Benjamin, 1946, Minerals and structural materials of the Watts Bar and Fort Loudon Reservoir areas: TVA Regional Products Research Div. Report No. 5, p. 2–5.

The occurrence and distribution of barite in the Sweetwater district of east Tennessee is described briefly. The location and a brief statement about the history of operation and production of the nine mines that yielded the major production from the district in the early part of 1943 are given. The location of five other mines abandoned or worked intermittently as of 1943 is included. Annual production in the area averaged 20,000 to 30,000 tons prior to 1940 and 60,000 tons in 1941 and 1942. Monroe County yielded 51,501 tons in 1942.

48 Gordon, C. H., 1918, Barite deposits of the Sweetwater district, east Tennessee: Tenn. Geol. Survey, Resources of Tenn., v. 8, no. 1, p. 48–82.

The geology and barite deposits of this district in parts of McMinn, Monroe, and Loudon Counties in eastern Tennessee are described in detail. The barite occurs in bedded veins or shattered zones in the Knox dolomite [Upper Cambrian and Lower Ordovician] and as masses in the residual clay derived from weathering of the dolomite. Only the residual deposits are of commercial importance. They occur along three northeastward trending narrow parallel belts about 20 miles long. Workable ore bodies appear only at intervals along the ore belts which are usually from 100 to 300 feet wide. In many places six to eight feet of alluvial red clay overlies the barite-bearing residual clay. The chief impurities in the ore are fluorite, chert, and iron oxide. Small amounts of sphalerite, galena, calcite, and manganese oxide are also found. The primary deposits are believed to have been deposited within breccia zones of the Knox dolomite by solutions that had leached the barium from the dolomite and associated limestones. The principal mines along the three barite belts are described. The history of mining in the district and the mining and preparation of the ore for market are discussed. Only the high grade (98–99% $BaSO_4$) barite is marketed. A table showing the amount of crude barite marketed in Tennessee from 1903 to 1916 is included.

49 Gordon, C. H., 1920, Barite deposits in upper east Tennessee: Tenn. State Geol. Survey Bull. 23 (Pt. 1, Ann. Rept. 1919), p. 65–70.

Barite deposits of upper east Tennessee are of two types—irregular fissure and gash veins in crystalline rocks, and residual deposits in breccia veins in limestones. Vein deposits occur in the vicinity of Del Rio, and residual deposits occur in several places in Greene County. The Del Rio region is underlain by quartzites and slates of Cambrian age. The Pond Ridge prospects about 1½ miles north of Del Rio yielded a small tonnage years ago. Considerable ore was mined from a vein deposit of hard crystalline barite in masses and stringers imbedded in clay at West Meyer 2½ miles east of Bridgeport. At East Meyer pure, hard crystalline barite was mined from a bedding plane vein in quartzite and conglomerate. A vein deposit at Rock Creek, four miles from Del Rio, was worked some years ago. In Greene County, four deposits all in residual clays overlying the Knox dolomite [Upper Cambrian and Lower Ordovician] formerly were worked. These deposits are in the vicinity of Greeneville, Jearoldstown, Midway, and Morristown. Indications appear favorable for the existence of workable bodies of barite in the vicinity of Jearoldstown.

50 Hale, D. P., Jr., 1938, Modern mining and beneficiation of barite at Cartersville, Georgia: Am. Inst. Min. Metall. Engineers Tech. Pub. 973, 13 p.; 1942, Trans., v. 148, p. 277–290.

Opencut mining and beneficiation of residual barite ore in the Cartersville district, Bartow County, Georgia are discussed. Overburden averaging 12 to 15 feet thick is removed by stripping. Hydraulic mining has been used successfully for recovery of the fines impounded in old mud ponds and in one mine where large limestone pinnacles were encountered in the residual clay. The chief impurities in the ore are silica and iron oxide. Silica is easily removed by washing and jigging. Manganese, where present, is separated by gravity methods. Since 1931 greater recovery of barite and a final product of higher grade has been made possible by finer crushing, tabling, and use of magnetic separators for removal of iron. Use of these improved methods has permitted mining in large areas previously considered unworkable and had more than doubled the reserves of minable ore as of 1938. Ore from Cartersville has been consumed chiefly by the lithopone and barium chemical industries.

51 Ham, W. E., and Merritt, C. A., 1944, Barite in Oklahoma: Okla. Geol. Survey Circ. 23, 42 p.

Barite occurrences in Oklahoma and general information on barite are reviewed. The deposits are either too small or of too low grade to be of commercial value as of 1944. The deposits are of 3 general types: 1) hydrothermal veins, 2) residual deposits and 3) sedimentary deposits. Hydrothermal veins containing small amounts of barite and metallic sulfides cut highly folded shales and quartzitic sandstones of the Stanley [shale of Pennsylvania age] in the Ouachita Mountains in northeastern McCurtain County. Coarsely crystalline masses of barite associated with ocherous limonite are embedded in clays derived from weathering of Cambrian and Ordovician dolomite in the Arbuckle Mountains of south-central Oklahoma. The lower Permian shales and sandstones of central and southwestern Oklahoma contain disseminated grains, concretions, and veins of barite. Some barite may form a cementing agent. Surface concentrations of high grade concretionary nodules in a few localities may offer the possibility for limited production of several thousand tons. The barite in these Permian sedimentary rocks may have been introduced as a secondary concentration from marine water.

52 Harding, A. C., 1941, Ground barytes for weighting drilling mud: Eng. and Min. Jour., v. 142, no. 1, p. 33–36.

Barite deposits and mining and milling practices at the National Lead Co. plant near El Portal, Mariposa County, California are reviewed. The deposit has been worked continuously since 1910; in 1941 it was the largest deposit west of the Rockies and yielded the only commercial witherite in the United States. The chief product is ground barite for use in drilling mud. Barite and witherite associated with silica and calcium carbonate occur in vertical shoots or lenses in two distinct belts each about 200 feet wide and 1200 feet apart in steeply dipping metamorphosed sedimentary rocks. Both mineralized belts are cut by the Merced River Canyon. Lenses on the south side of the river contain principally barite and those on the north side contain a higher percentage of witherite. Contacts of the ore with the wall rock of siliceous limestone and schist are generally sharp. The deposits have been worked to a depth of 350 feet without reaching their lower limit. The origin of the deposit is attributed to replacement of limestone lenses by barium sulphate and carbonate.

53 Harding, A. C., 1948, Barite production in the United States: Am. Inst. Min. Metall. Engineers Tech. Pub. 2414, 6 p.

The geology and mining and milling operations at the major barite deposits in the United States are described briefly. Production and consumption of barite in 1945 and specifications for the various grades of barite ore used in different industries are listed. It is estimated that inferred reserves at properties now in production or being developed would yield at least a supply for 20 years at the rate of consumption in 1948.

54 Harness, C. L. and Barsigian, F. M., 1946, Mining and marketing of barite: U. S. Bur. Mines Inf. Circ. 7345, 78 p.

Information about the geologic occurrence, mining, treatment, and production of barite ore at all major barite mines or districts in the United States is summarized. Mining and methods of preparation of ore for the market are described. Uses of barite, specifications of barite ore for different uses, prices, marketing, and manufacture and utilization of barium chemicals are reviewed.

55 Heck, E. T., 1940, Barium in Appalachian salt brines: Am. Assoc. Petroleum Geologists Bull., v. 24, no. 3, p. 486–493.

Appreciable amounts of barium have been found in many [Appalachian] brines from rocks of Silurian, Devonian, Mississippian, and Pennsylvanian age in the Appalachian region. Brines from productive oil and gas areas contain the highest percentage of barium. The barium is believed to have been present in barite in the sediments and was brought into solution by reduction of $BaSO_4$, probably by the action of bacteria.

56 Hewett, D. F., and others, 1936, Mineral resources of the region around Boulder Dam: U. S. Geol. Survey Bull. 871, p. 149–151.

Occurrences and deposits of barite in the region around Boulder Dam in adjacent parts of California and Nevada are noted briefly. Barite is common particularly as a gangue mineral in Tertiary metal veins in some parts in the region. Five deposits are described in which barite occurs in veins or as replacements. "Most of the deposits are relatively small and of poor quality." Small production has been reported from a few properties and "with sufficient demand a moderate production might be made."

57 Hill, J. M., 1917, Barytes and strontium, [in 1915] *in* Mineral resources of the United States, 1915, pt. 2—nonmetals: U. S. Geol. Survey, p. 161–185.

In addition to the usual statistics on annual production, consumption, and exports and imports of barite, the principal known deposits in the United States as of 1915 are described by States and are shown on a map on which are also indicated the location of plants manufacturing barium products. Methods of mining and preparation of barite for market are discussed. This reference is the most complete summary available as of 1915 concerning the production of barite in the United States.

58 Howland, A. L., 1936, An occurrence of barite in the red beds of Colorado: Am. Mineralogist, v. 21, no. 9, p. 584–588.

A small deposit two miles southwest of Hartsel, Park County, is described. In 1932 development work consisted of pits of various size from which some barite had been mined. Further development was done in 1934 and 1935. It is not known whether commercial ore was produced. The barite occurs as a replacement in vertical veins one to two feet wide and in irregular layers six inches to three feet wide in gently dipping beds of a limestone member of the Maroon formation [of Pennsylvanian and] Permian age. The barium is believed to have been leached from the surrounding sediments by meteoric waters and precipitated by reaction with gypsum in the limestone.

59 Hubbell, A. H., 1942, New Riverside - producer of barytes in Georgia: Eng. and Min. Jour., v. 143, no. 10, p. 62–65.

Mining and milling operations of the New Riverside Ochre Co. in Bartow County, Georgia are summarized. Barite occurs irregularly distributed in clay, eight tons of which will yield an average of one ton of washed barite. Concentrations of barite are pockety and hard to find because overburden may be as much as 60 feet thick. The flow sheet of the washing plant is described in detail. The final products are of three grades: 1) drilling mud, 92 percent $BaSO_4$ with 5 percent iron; 2) lithopone, 96 percent $BaSO_4$ with not more than 1.0 percent iron; and 3) glass, 98 percent $BaSO_4$ with not more than 0.3 percent iron.

60 Hubbell, A. H., 1943, Barytes—a non-metallic product of eastern Tennessee: Eng. and Min. Jour., v. 144, no. 1, p. 63–65.

Mining and treatment of barite ore from residual deposits in the Sweetwater district of Tennessee and in Bartow County, Georgia are discussed. In the Sweetwater district, overburden as much as 40 feet thick is stripped from the ore-bearing clays which may be as much as 30 feet thick. Each mine generally has its own washing plant. In some operations the washed product may be subsequently cleaned of the remaining iron by tabling, drying, sizing, and magnetic separation. In Bartow County, Georgia, on property operated by the Barytes Mining Co., overburden is 10 to 30 feet thick and the underlying ore-body is over 50 feet thick. Although the barite content of this deposit is slightly less than that of the Tennessee mines, the output is more uniform. Mining and treatment of ore is essentially the same as in Tennessee. A high grade product containing 96 percent $BaSO_4$ or more and a low grade product containing 92 percent $BaSO_4$ are produced.

61 Hull, J. P. D., 1920, Barytes deposits of Georgia: Ga. Geol. Survey Bull. 36, 146 p.

Occurrence, distribution, origin, production, and mining and milling of barite in Georgia are discussed. The stratigraphy and structure of the Cartersville district are described in detail. More than 60 individual mines and prospects in Bartow, Murray, Whitfield, Gordon, Floyd, Cherokee, and Polk Counties are described. The deposits are of the following types: 1) vein, 2) replacement, 3) breccia, 4) residual, 5) colluvial or residual hillside, and 6) alluvial. The primary deposits (types 1, 2, and 3) occur in pre-Cambrian igneous rocks and Paleozoic sediments. Barium is believed to have been leached from feldspars and mica in the crystalline rocks by circulating meteoric and thermal waters which moved upward along fault and fracture openings to carbonaceous sediments where precipitation of barite occurred. Vein deposits have been worked on a small scale but only the residual and colluvial deposits are of economic importance. The deposits occur almost wholly in the Appalachian Valley region of northwest Georgia in a belt 75 miles long with a maximum width of 25 miles near its center. All the large deposits which have been worked are in the Cartersville district. From 1916 to 1919 Georgia ranked first in production of barite in the United States. Production in 1919 was estimated at 90,000 tons, all from the Cartersville district.

62 Hunter, C. E., and Gildersleeve, Benjamin, 1946, Minerals and structural materials of western North Carolina and north Georgia: TVA Regional Products Research Div. Rept. C, p. 9–10.

Barite deposits in Gaston and Madison Counties are described briefly. Extensive vein deposits of white barite occur in Gaston County, extending from a point four miles south of Bessemer City to the South Carolina state line. Deposits in the Stackhouse area of northwestern Madison County have intermittently yielded an estimated production of 300,000 tons between the latter part of the nineteenth century and 1927. The barite occurs in veins mainly in a fault zone between the [pre-Cambrian] Max Patch granite and the Cambrian Snowbird [formation]. This area, adjacent to the Del Rio district of Tennessee, is believed to contain large reserves of "rather pure" barite.

63 Jenkins, O. P., and others, 1949, The counties of California—mineral resources and mineral production during 1947: Calif. Dept. Nat. Res. Div. of Mines Bull. 142, p. 13 and pls. 1 and 4.

The report which in past years has been issued as an annual statistical bulletin known as "Mineral Production of California", has been issued this year with special emphasis on the mineral resources of the counties of California. Production of barite is reported from single properties in Mariposa and Plumas Counties. Barite from Mariposa County was used chiefly for drilling mud and that from Plumas County was used for the manufacture of barium chemicals. A map of California locates barite deposits in 12 counties.

64 Jewell, W. B., 1947, Barite, fluorite, galena, sphalerite veins of Middle Tennessee: Tenn. Dept. Conserv., Div. Geology Bull. 51, 114 p.

The location, geologic occurrence, and methods of mining small deposits of barite, fluorite, sphalerite, and galena in fissure veins of middle Tennessee are discussed in detail Mines and prospects also are described. Most of the deposits occur within a 20 mile radius of the intersection of DeKalb, Smith, and Wilson Counties in the Ordovician limestones of the Nashville dome. The veins, which range from a few inches to six feet in width, occur chiefly as fillings in limestone breccia in steeply dipping shear zones which trend northeast. Replacement of the wall rock by barite has been small. Barite is one of the most abundant minerals in the veins; in places it makes up almost the entire vein filling. The barite is generally granular or massive and is often intimately mixed with fluorite and calcite. The vein material is believed to have been deposited from rising magmatic solutions of probable post-Carboniferous age. Only small amounts of lead, zinc, barite, and fluorite have been produced from the area. In 1934 two carloads of barite were shipped from Davidson County and further production may be feasible on a small scale. The veins have not been adequately prospected.

65 Johnson, B. L., 1941, Marketing of barite: U. S. Bur. Mines Inf. Circ. 7149, 16 p.

General information is presented about the uses, production, markets, and prices of crude barite. Also included is a list of barite producers, buyers, grinders, and producers of barium products, arranged by states.

66 Jones, T. A., 1948, Barite deposits in the Ouachita Mountains, Montgomery, Polk, and Pike Counties, Ark.: U. S. Bur. Mines. Rept. Inv. 4348, 15 p.

Ten barite deposits in the Ouachita Mountains of western Arkansas, which were investigated by the U. S. Bureau of Mines in 1946 and 1947, are described. The deposits occur as lenticular bodies of impure barite near the contact of the Stanley shale of Pennsylvanian age and Arkansas novaculite of Devonian [and Mississippian] age in beds of both formations. The deposits are associated with the Mazarn syncline. The Bear Creek prospect in Pike County contains boulders of crystalline barite in residual clay of the Stanley shale; it is the only residual deposit known in the area. At the Pigeon Roost Mountain deposit in southeastern Montgomery County, barite occurs in three lenticular bodies near the base of the Stanley shale. This deposit is near the axis of the Mazarn syncline and is the largest yet found in the area. Barite in the deposits of this area would be suitable for use in drilling mud.

67 Jones, W. B., and McVay, T. N., 1934, Barite deposits of the Sinks district, Bibb County, Alabama: Econ. Geology, v. 29, no. 8, p. 761–766.

Barite deposits in the northeast corner of Bibb County in central Alabama are described. Barite in veins and cavities in Ordovician limestone is associated with fluorite, calcite, limonite, and native sulfur. Hydrothermal origin is advocated because of the intimate association of barite with fluorite. Residual deposits derived from the primary deposits have a much higher content of barite than other deposits mined in the past in Alabama. The authors believe that these deposits may be profitably mined.

68 Julihn, C. E., and Horton, F. W., 1940, Mineral industries survey of the United States: U. S. Bur. Mines. Bull. 424, pt. II, p. 168–170.

Barite deposits at the El Portal and Egenhoff mines near El Portal, Mariposa County, California are described. Mining and milling at the El Portal mine of the National Lead Co. is summarized. Large quantities of high grade barite and witherite have been developed by crosscuts at the Egenhoff mine.

69 Just, Evan, 1943, An Arkansas travelogue: Eng. and Min. Jour., v. 143, no. 12, p. 64–65.

The mining and milling operations at Magnet Cove are described briefly. Barite occurs as a replacement near the base of the Stanley shale (Pennsylvanian) in a syncline plunging southwestward. At the National Lead Co. mine near the eastern end of the syncline, the southern limb of the fold is nearly vertical and the northern limb dips 40° south. At the mine, the barite horizon in the bottom of the fold is 200 feet beneath the surface. The barite deposit, 40–75 feet thick, is mined in an open cut about 500 feet long. After milling, the barite in the ore is then concentrated by flotation to yield a product with a specific gravity of 4.35 used entirely for drilling mud.

The smaller open pit mine of the Magnet Cove Barium Corp. is adjacent to the National Lead Co. mine. The mill is in nearby Malvern where ore is concentrated by a flotation process which floats barite, in contrast to the process used by National Lead Co. in which the barite is depressed.

70 Just, Evan, 1948, Barite production upheld by improved equipment: Eng. and Min. Jour. v. 149, no. 1, p. 71–73.

The use of modern earthmoving equipment and more efficient beneficiation methods in the old Washington County, Mo. barite district have enabled operators to obtain a greater recovery per acre, and to rework many areas previously mined by primitive methods. Residual barite occurring with soil and gangue in a ratio of approximately 1 to 10 is dug from pits with diesel power shovels, and hauled by trucks a short distance to movable washing plants. The mill flowsheets of two operations are given.

71 Keith, Arthur, 1904, Asheville folio North Carolina-Tennessee: U. S. Geol. Survey Geol. Atlas, folio 116, p. 9.

Small irregular veins of barite generally only a few inches wide occur in a narrow zone extending about five miles northeast from Bluff, Madison County. The veins occur in granite and quartzite near the contact of the two rock types. In 1904 the deposits on Spring Creek were the only ones being mined in the area. Mining was done chiefly in open cuts. A "considerable amount" of barite is reported to have been mined about one mile southeast of Stackhouse.

72 Kesler, T. L., 1940, Structure and ore deposition at Cartersville, Georgia: Am. Inst. Min. Metall. Engineers Tech. Pub. 1226, 18 p.; 1941, Trans., v. 144, p. 276–293.

The general geology and ore deposits of the Cartersville district are described, with emphasis on the relation of structure to ore deposition. Deposition of ore was controlled by rock composition and structure. Hydrothermal solutions of magmatic origin ascended to the carbonate rocks of the district along steep oblique fault planes and fractures in a highly folded zone of the Weisner formation and Shady dolomite of Early Cambrian age. Ore deposition occurred chiefly in the carbonate rocks of the Shady dolomite rather than in the quartzites and schists of the underlying Weisner formation. Examples of structural control in four areas in the district are described. The currently mined barite ores are principally surficial weathered products of the primary deposits.

73 Kesler, T. L., 1949, Occurrence and exploration of barite deposits at Cartersville, Georgia: Am. Inst. Min. Metall. Engineers Trans., v. 184, p. 371–375.

The geology of the residual barite deposits of the district are described briefly. The primary ore is localized in three differently oriented groups of faults. The search for new ore in the residual clay may be guided by projecting the trend of the fault zones seen in outcrops of the Weisner formation along the ridge crests across the areas of residual clay. Because many of the good deposits on the surface or at shallow depth have been found, prospecting by drilling at greater depths is necessary. The problems of drilling and the methods of interpreting the resulting data compiled by the Paga Mining Company are reviewed.

74 Kesler, T. L., 1950, Barite deposits southeast of the Appalachian plateaus, *in* Snyder, F. G., ed., Symposium on mineral resources of the southeastern United States, p. 88–98: Univ. Tenn. Press, Knoxville, Tenn.

The occurrence and origin of the major barite deposits in the southeastern United States are summarized from the reports of recent workers in the region. The areas discussed include the Cartersville district and other areas, Georgia; the Sweetwater and Del Rio-Hot Springs districts, Tennessee; the Central Carolina district in North and South Carolina; and areas in Alabama. Most workers believe that the barite and associated minerals were deposited by hydrothermal solutions of magmatic origin. Laurence and Dunlap attribute ore deposition in the Sweetwater district to thermal waters but do not specify their source. Although igneous rocks are not obviously associated with most of the deposits, a magmatic source for the ore bearing fluids is suggested by the similarity of their mineralogy to metalliferous deposits of undoubted hydrothermal origin. Evidence suggests that more than one period of barite mineralization occurred. Most investigators believe the deposits are late Carboniferous; Edmundson believes that the deposits in Virginia are Triassic in age.

75 Kesler, T. L., 1950, Geology and mineral deposits of the Cartersville district, Georgia: U. S. Geol. Survey Prof. Paper 224, 97 p.

The geology and ore deposits of this district in northwest Georgia are described. By the end of 1943, the district had yielded about 1,830,000 long tons of barite representing 24 percent of the total production of the United States. Rocks of the district are Cambrian metasedimentary rocks of the Weisner, Shady, Rome, and Conasauga formations and feldspathic gneisses derived from them. These rocks are folded into major anticlinoria and synclinoria that extend beyond the limits of the district. The primary ore and gangue minerals were deposited by hydrothermal solutions in steeply dipping faults which trend roughly parallel and oblique to the axis of the major folds. Primary barite occurs as thin veins and irregular bodies principally in carbonate rocks of the Rome formation. The barite which is coarsely crystalline encloses small amounts of pyrite and other sulfides and is associated with quartz and carbonates. Weathering of these primary deposits has freed the barite which remains as fragments ½ to 6 inches across distributed unevenly through the residual clay. Pyrite enclosed by the barite is usually weathered to limonite, and angular boulders of jasperoid commonly accompany barite in the clay. These deposits constitute the barite ore of the district and are mined in open cuts. The average proportion of recoverable barite in clay in large deposits ranges from 11.8 to 17.5 percent. The deposits are believed to be "far from exhausted; but—their recovery will generally involve a gradual increase in mining costs." Nine major barite mines are described and a table summarizes data on 35 barite mines that have been commercially productive.

76 Kidwell, A. L., 1946, Blue barite from Texas County, Mo.: Rocks and Minerals, v. 21, no. 12, p. 849–850.

An abandoned open-pit barite mine six miles southwest of Houston, Texas County is the only known commercial barite deposit within a radius of 60 miles. Blue barite associated with limonite and calcite occurs as a filling which cements large blocks of dolomite in a collapsed solution cavity. The country rock is Jefferson City dolomite [Ordovician] containing chert and drusy quartz. This deposit was last operated during 1941 and 1942 by the Murphy Mining Company.

77 Knechtel, M. M., and others, 1948, Map showing construction materials and nonmetallic mineral resources of Montana: U. S. Geol. Survey Missouri Basin Studies Map no. 11.

A map shows the location of barite deposits in Glacier National Park and Missoula County. Very little barite has been produced in Montana but occurrences of residual barite in Upper Cretaceous clays are reported in Missoula and Lincoln Counties. Barite deposits are also known in Custer, Wibaux, Dawson, Musselshell, Pondera, Madison, and Phillips Counties.

78 Kiilsgaard, T. H., 1950, Geology and ore deposits of the Triumph-Parker mine mineral belt, *in* Anderson, A. L., and others, Detailed geology of certain areas in the Mineral Hill and Warm Springs mining districts, Blaine County, Idaho: Idaho Bur. Mines and Geology Pamph. 90, p. 60.

The Sun Valley barite mine (Bonnie group) about nine miles northwest of Hailey, has been operated intermittently during recent years, and was under lease to the Simplot Co. in 1950. The barite occurs as a series of lenticular masses in the Wood River formation [Pennsylvanian]. Ore is shipped by rail to the mill in Pocatello where it is prepared for use in drilling mud. Selective mining to control contamination by silica yields an ore containing 84 to 88 percent $BaSO_4$ with a specific gravity of 4.0 to 4.1. In 1949, 6,700 tons of barite were produced.

79 Kottlowski, Frank E., 1953, Geology and ore deposits of a part of the Hansonburg mining district, Socorro County, New Mexico: N. Mex. Bur. Mines and Mineral Res. Circ. 23, 9 p.

Data are supplied to aid exploration of the barite-fluorite-galena ore bodies on the west face of the Oscura Mountains. Stratigraphy, structure, and the nature of the ore deposits are described briefly. The ore is localized in fracture zones and solution cavities in limestones of Paleozoic age.

80 Ladoo, R. B., and Myers, W. M., 1951, Nonmetallic minerals: New York, McGraw-Hill Book Co., Inc., p. 67–82.

General information on barite is given: occurrences, production, consumption, mining, milling, ore specifications, marketing, and uses. Short descriptions of principal deposits in the United States and other countries are included. Tables show world production of barite from 1942 to 1948; salient statistics of barite, witherite, and barium chemical industries in the United States from 1944 to 1948; domestic barite sold or used by producers in the United States from 1946 to 1948 by states. A brief section on witherite is included. The bibliography contains 42 references on barite and witherite.

81 Larrabee, D. M., and others, 1947, Map showing construction materials and nonmetallic mineral resources of Colorado: U. S. Geol. Survey Missouri Basin Studies Map no. 10.

On the map are indicated the location of barite deposits in Custer, Park, and Lake Counties. The text states that barite occurs in Boulder, Custer, Lake, Las Animas, Park, Pitkin, and Pueblo Counties. Deposits have been developed in Boulder, Custer, and Park counties. Small production from veins and layers in limestone has been recorded in 1915, 1916, and 1939 to 1941.

82 Laurence, R. A., 1938, Black barite deposits in upper east Tennessee: Tenn. Acad. Sci. Jour., v. 13, no. 3, p. 192–197.

Deposits of large, crystalline masses of exceptionally pure, dark barite occur in residual clay in the Fall Branch district of upper east Tennessee. The deposits are associated with a thrust fault in the upper Knox dolomite ("Post-Nittany") [Upper Cambrian and Ordovician] and form a long narrow belt extending northeastward through Greene, Washington, and Sullivan Counties. Associated deposits of white barite with sphalerite and galena are found in residual clay and in veins and breccia zones in the underlying dolomite. The black barite, which apparently occurs only in the residual clay, is more pure than the white barite. The dark color and fetid odor are attributed to small amounts of carbonaceous material on cleavage and fracture planes. The black barite is stable while enclosed in residual clay but will decrepitate readily at low temperatures. Stockpiles exposed to summer sun have disintegrated almost to powder in a short time. White barite was mined in the district in the late 1890's and during World War I. In 1935 about 170 tons of chiefly the black barite were shipped from the district. No production has been recorded since that time. In spite of the purity of the deposits, they are probably not of much commercial value because of their small size and scattered distribution.

83 Laurence, R. A., 1939, Origin of the Sweetwater, Tennessee barite deposits: Econ. Geology, v. 34, p. 190–200.

This important district had produced about 600,000 tons of barite by 1938. The residual deposits which occur along three parallel belts are underlain by irregular fissure veins in the [Ordovician] Beekmantown limestone. The chief vein minerals, in order of their deposition, are calcite, pyrite, fluorite, and barite. The veins are simple fissure fillings and occur in coarsely crystalline dolomite produced by alteration and recrystallization of limestone. The alinement of the deposits parallel to the regional strike of the country rocks suggests mineralization was restricted to openings created by shattering and brecciation of certain favorable beds. The deposits are believed to have been formed by ascending thermal waters of magmatic or meteoric origin. Igneous rocks are absent from the district.

84 Lewis, J. V., 1919, The magmatic origin of barite deposits: Econ. Geology, v. 14, no. 7, p. 568–570.

The localization of barite deposits in a disturbed belt extending from southeastern Missouri to north-central New York is noted. The belt is characterized by anticlinal folds, faults which are cut by basic dikes, veins, and breccias containing barite, fluorite, and sulfides. The barite and associated deposits in this belt are believed related to igneous activity which is not necessarily of the same age in all localities. Barite occurrences in Triassic shales and diabase in New Jersey are believed related to the Late Triassic igneous activity in that region.

85 Lindgren, Waldemar, 1926, Ore deposits of the Jerome and Bradshaw Mountains quadrangles, Arizona: U. S. Geol. Survey Bull. 782, p. 128–129.

A vein reported to be 15 to 20 feet wide containing much barite and manganiferous ankerite and minor amounts of galena and sphalerite was worked at the Silver Belt mine in the late 1870's and in 1906 for silver and lead ore.

86 Logan, C. A., 1941, Mineral resources of Nevada County: Calif. Jour. Mines and Geology, v. 37, no. 3, p. 378–379.

The Democrat barite mine near Alta in Nevada County is reported to have been one of the largest sources of barite in the state between 1919 and 1930. The ore body was 250 feet long and 15 to 24 feet wide near the surface. The mine had not been worked for several years prior to 1941. The Spanish barite deposit about five miles west of Graniteville was being developed in 1940 and was reported to contain several hundred thousand tons of barite. Ore is hauled 20 miles to Emigrant Gap for shipment.

87 McCallie, S. W., 1926, Mineral resources of Georgia: Ga. Geol. Survey Bull. 23, revised edition, p. 12–15.

The information of reference 61 is briefly summarized. Statistics on production of barite in Georgia from 1919 to 1924 are presented along with a list of producers as of 1926.

88 McElwaine, R. B., 1946, Exploration for barite in Hot Spring County, Arkansas: U. S. Bur. Mines Rept. Inv. 3963, 21 p.

The geology and development of Magnet Cove barite deposit are reviewed along with the results of U. S. Bureau of Mines drilling project conducted in 1944 and 1945 to determine reserves and extent of the deposit. A geologic map shows the location of the 10 completed diamond drill holes; The logs of all holes and analyses of barite penetrated are also included. Results of drilling indicate a large tonnage of ore in reserve. Mine workings and mining methods are briefly described.

89 McElwaine, R. B., 1946, Exploration of barite deposits in Montgomery County, Ark.: U. S. Bur. Mines Rept. Inv. 3971, 24 p.

The results of exploration of the Gap Mountain, Fancy Hill, and Sulphur Mountain barite deposits by the U. S. Bureau of Mines in 1945 are listed. These deposits occur as lenticular replacement bodies near the base of the highly folded Stanley shale [Pennsylvanian] and in the upper part of the underlying Arkansas novaculite of Devonian [and Mississippian] age. The barite is exposed along the sides of parallel west-trending ridges of the Ouachita Mountains. The barite is similar to that at Magnet Cove and is amenable to concentration by flotation. Exploration indicates the existence of an "appreciable amount of barite suitable for commercial use." The report includes diamond drill core logs, analyses of barite samples, cross sections of trenches, and sketch maps of the deposits. Geologic conditions in the surrounding area indicate that additional deposits may be found. Suggestions for prospecting are given.

90 Marbut, C. F., 1907, The geology of Morgan County: Mo. Bur. Geology and Mines, 2d ser., v. 7, p. 86–87.

Brief descriptions of four barite deposits mined in 1907 are presented. The barite, associated with galena, occurs in pocketlike masses in clay derived residually from the Gasconade dolomite [Ordovician].

91 Mather, W. B., 1946, The mineral deposits of Morgan County, Missouri: Mo. Geol. Survey and Water Res. Rept. Inv. 2, 207 p.

Barite has been produced intermittently since 1870 from deposits in Morgan County, in the geographic center of the Central Missouri barite district. Greatest activity was between 1935 and 1942. Barite occurs in fissure breccia, circle, and residual deposits. Production has been chiefly from the last two types, the residual deposits yielding the larger amount. Individual mines and prospects are described and located on the map.

92 Mather, W. B., 1947, Barite deposits of central Missouri: Am. Inst. Min. Metall. Engineers Tech. Pub. 2246, 15 p.; Trans., v. 173, p. 94–108.

Barite is mined from small, high grade, relatively deep, isolated circle, replacement, and residual deposits. Mining operations are small because the deposits are small and scattered. The ore is mined in open pits and is concentrated by crushing and jigging. Concentrates contain 97 to 98 percent barite. Production from the district in 1946 was less than 10,000 tons. The deposits occur chiefly in the dolomites and limestones of the Gasconade, Roubidoux, and Jefferson City formations of Ordovician age and in the Burlington limestone of Mississippian age. Six transitional types of deposits are recognized: fissure, breccia, circle, solution channel, replacement, and residual. The circle and residual deposits are commercially the most important. The diameter of the circle deposits ranges from 60 to 300 feet. The ore containing from 20 to 30 percent barite by weight, has been mined to a depth of 100 feet. (See also Mather, 1946.) The richest residual deposits are derived from weathering of circle and replacement deposits. Evidence is cited to support the author's belief that the barite and associated sulfides were deposited from relatively cool hydrothermal solutions.

93 Mather, W. B., 1950, Nonmetalliferous mineral resources in Arkansas: Am. Inst. Min. Metall. Engineers Trans., v. 187, p. 582–583.

The deposits of commercial barite and their reserves are reviewed. Arkansas has been the principal barite producer in the United States since 1945. Production has been from a synclinal replacement deposit near Magnet Cove, mined by the National Lead Co. and the Magnet Cove Barium Corp. Barite apparently has replaced carbonate-rich zones at the base of the Stanley shale [Pennsylvanian]. The ore-bearing zone is 35 to 45 feet thick and averages about 67 percent $BaSO_4$. Ore is mined in open pits and underground. Barite is concentrated by flotation and is used almost entirely for drilling mud. This deposit was estimated to contain 8,400,000 tons of reserves as of January 1949. Smaller deposits of similar type have been prospected in Montgomery, Polk, and Pike counties. Reserves for the entire state were estimated to be 15,000,000 tons of ore containing more than 40 percent barite as of January 1949.

94 Munyan, A. C., 1951, Geology and mineral resources of the Dalton quadrangle, Georgia-Tennessee: Ga. Geol. Survey Bull. 57, p. 100–101.

A small open pit mine yielded barite for a short time in 1948. The deposit near Camp Ground Mountain, east of Eton, consists of "considerable quantities of small barite nodules" in sandy residum between pinnacles of Conasauga limestone [Cambrian] which contain thin veinlets of barite. The mine was not successful and has not been operated since 1948. Other barite deposits in this region are described by J. P. Hull (1920). Barite deposits of the Dalton area appear to be small.

95 Murdoch, Joseph, and Webb, R. W., 1948, Minerals of California: Calif. Dept. Nat. Res. Div. Mines Bull. 136, p. 64–67.

Occurrences of barite are reported in 29 counties of California. The location and a bibliography are cited, where possible, for each occurrence. The geologic setting of the more important occurrences is briefly reviewed.

96 Murdock, T. G., 1950, The mining industry in North Carolina from 1937 to 1945: N. C. Dept. Conserv. Devel., Div. Mineral Res., Econ. Paper 65, p. 22–23.

Activity in the barite areas of North Carolina during 1937–1944 was restricted to the Hot Springs district, where the U. S. Bureau of Mines did core drilling on the Betts property. Small production was reported from a new locality near Stackhouse.

97 Norman, James, and Lindsey, B. S., 1941, Flotation of barite from Magnet Cove, Arkansas: Am. Inst. Min. Metall. Engineers Tech. Pub. 1326, 5 p.

Tests on beneficiation of barite ore from Magnet Cove are reviewed. The barite is intimately mixed with quartz, small amounts of iron oxide, and residual shale. Crude ore tested had a specific gravity of 4.03 and assayed 85.1 percent $BaSO_4$, 11.11 percent SiO_2, and 2.85 percent R_2O_3. After grinding the ore to 100 percent minus 325 mesh to liberate the barite and siliceous gangue, the minerals were separated by froth flotation, without desliming, using sodium silicate, a fatty acid, and pine oil as reagents. A concentrate with a specific gravity of 4.395 and containing more than 98 percent $BaSO_4$ was produced while recovering about 90 percent of the barite in the mill-heads.

98 Northrop, S. A., 1944, Minerals of New Mexico: Univ. of New Mexico Press, p. 79–81.

Barite occurrences in 16 counties are listed. Barite is described as abundant in occurrences in Bernalillo, Dona Ana, Grant, Hidalgo, Sandoval, and Socorro Counties. It has been mined a few miles south of Barton, Bernalillo County, at Devil's Canyon mine, Dona Ana County, and in the Derry district, Sierra County.

99 O'Meara, R. G., and Coe, G. D., 1936, Froth flotation of southern barite ores: Am. Inst. Min. Metall. Engineers Tech. Pub. 678, 6 p.

Results of froth flotation experiments on samples of impure southern barite ores containing iron oxide, quartz, calcite, fluorite, and sulfides indicate that the ores can be beneficiated by flotation. The ores tested are identified only as southern barite ores from properties "either idle or handicapped in their operations by the lack of satisfactory concentration methods."

100 Oriel, S. S., 1950, Geology and mineral resources of the Hot Springs window, Madison County, North Carolina: N. C. Dept. Conserv. Devel., Div. Mineral Res. Bull. 60, p. 48–52.

The occurrence, mineralogy, and origin of the barite deposits of the Hot Springs area are discussed. Descriptions of mines and prospects are included. Production has been largely from the Stackhouse and Gahagan mines and the A. G. Betts Sandy Bottom property. The barite occurs in veins, irregular masses, and small disseminations along thrust faults and in the adjacent wall rocks. Oriel believes that the barite associated with quartz, fluorite, sericite, hematite, pyrite, chalcopyrite, and calcite is of hydrothermal origin. The Stackhouse area is believed to contain large reserves of barite.

101 Ostrander, C. W., 1942, Barite prospect near Johnsville, Frederick County, Maryland: The Natural History Society of Maryland Bull., v. 12, no. 3, p. 44.

Small deposits of barite have been prospected and mined. A small lens-shaped deposit in limestone 1½ miles southeast of Johnsville was worked many years ago and is reported to be "the only mine operated for barite in the State of Maryland."

102 Pallister, H. D., 1952, Barite in Alabama: Ala. Acad. Sci. Jour., v. 21, p. 45.

Production, location, geology, origin, reserves, and the future of the barite industry in Alabama are summarized briefly. Barite in veins and residual deposits occurs throughout the eastern part of State extending from near Centerville in Bibb County to near the Georgia State line in Cherokee County. Primary deposits occur as veins and breccia fillings and were probably formed by hydrothermal solutions. Residual deposits, some of large extent, were derived by weathering of pre-existing deposits. Although reserves of barite in Alabama are large and widely distributed, their economic value can be determined only by extensive prospecting. In 1952 several deposits were being considered for development, but no barite was produced in the State during the year.

103 Parks, Bryan, 1932, A barite deposit in Hot Spring County, Arkansas: Ark. Geol. Survey Inf. Circ. 1, 52 p.

Results of prospecting the Chamberlin Creek valley deposit near Magnet Cove, Hot Spring County are described. The barite occurs near the base of the Stanley shale [Pennsylvanian] in a syncline plunging to the west. The east end of the syncline is closed: the west end is cut by the intrusive rocks of Magnet Cove. The barite is considered a hydrothermal replacement of of the porous beds at the base of the Stanley shale. The bed with barite on the north flank of the syncline is 44 feet thick and has been traced for three quarters of a mile. The deposit was estimated to contain at least one million tons of barite within 100 feet of the surface in an area of seven acres. The average of 15 chemical analyses of barite ore show 86.10 percent barium sulfate, 10.29 percent silica, 1.28 percent iron and aluminum oxides and small amounts of magnesia, calcium, and titanium oxides. Concentrates containing 97 percent $BaSO_4$ were obtained in flotation tests. No barite had been produced from the deposit as of 1932.

104 Parks, Bryan, 1932, Great barite deposit of Arkansas: Pan Am. Geologist, v. 57, no. 1, p. 329–332.

The geology and origin of the Magnet Cove barite deposit are discussed. A geologic map and cross section are included. This is a summary of the paper by Parks (1932).

105 Penhallegon, W. J., 1938, Barite in the Tennessee Valley region: TVA Geol. Bull. 9, 47 p.

The geology and barite deposits of five major districts and several less important areas in six States of the Tennessee Valley region are described briefly. A summary of the history of barite mining, beneficiation, and production in Tennessee, Georgia, Alabama, Virginia, and Kentucky is given. The Cartersville district, Georgia and the Sweetwater and Pall Mall districts, Tennessee were the chief producing areas in 1936. A table showing production of barite by years from 1882 to 1936 in States of the Valley region is included. Other tables show statistics on barium products sold and used in the United States. Mining and concentration of barite ore, chiefly in the Cartersville and Sweetwater districts, is discussed. A table showing the analyses of a wide variety of samples from five districts in the Valley region is included with a brief statement on buyer's specifications. The manufacture and uses of barium compounds are summarized.

106 Prater, L. S., 1948, Beneficiation tests on ore from the Sun Valley Barite mine, Blaine County, Idaho: Idaho Bur. Mines and Geol. Pamph. 81, 11 p.

Tests made on ore from the Sun Valley mine indicate that it may be beneficiated by flotation. Difficulty is experienced in obtaining a wettable product for use in drilling muds because of the film of fatty acid left on particles processed by flotation. The present practice of destroying the film by calcining is expensive. Tests were made to determine the feasibility of flotation at a coarser size followed by grinding to produce sufficient new wettable surfaces. Coarse particles could be floated but beneficiation is much poorer than with fine particles. The best means of obtaining a wettable barite product by flotation, without subsequent calcination, is to depress the barite and float the impurities.

107 Rankin, H. S., Laurence, R. A., Davis, F. A. W., Houston, E. C., and McMurray, L. L., 1938. Concentration tests on Tennessee Valley barite: Am. Inst. Min. Metall. Engineers Tech. Pub. 880, 13 p.; 1942, Trans., v. 148, p. 291–303.

"Experiments were conducted to determine the application of decrepitation or flotation in simplifying the concentration of barite by removing the iron oxide and silica in one operation. Bleaching studies were made to determine the bleachability" of the off-color ores of the area. A brief description is given of the geology and barite deposits of the Sweetwater, Pall Mall, and Fall Branch districts of Tennessee from which were obtained the samples used in the tests. Ores from the Sweetwater district yield to decrepitation "to give concentrates of commercial quality, but with rather low recoveries". Ores from the other districts "either failed to decrepitate at all or decrepitation was so slight as to be of little interest as a concentrating operation." Froth flotation tests on ore from the Sweetwater district showed that "barite could be floated to a salable concentrate with the feed assay running as high as 9.8 percent iron oxide and 36.7 percent silica." Bleaching by use of acids and calcining gave promising results on most samples. Black barite from the Fall Branch district and barite ore with a rather high silica content from the Sweetwater district were somewhat resistant to bleaching. Few samples attained commercial whiteness without calcining.

108 Reyner, M. L., and Trauerman, C. J., 1950, Directory of Montana mining properties 1949: Mont. Bur. Mines and Geology Memoir 31, p. 126.

Five barite deposits in Beaverhead, Missoula, Musselshell, and Phillips Counties are indicated on a state map showing areal distribution of mineral resources. No barite properties are listed in the directory.

109 Robinson, L. C., 1931, The vein deposits of central Kentucky: Ky. Geol. Survey, 6th ser., v. 41, pt. 1, p. 7–127.

The geology of vein deposits in north central Kentucky is described. The veins occur along or near three well defined fault zones in Ordovician limestones and limey shales. The veins of barite, fluorite and calcite average four feet in width, generally trend north, and dip steeply. Barite is most abundant and is the only mineral of economic importance, although the others may be recovered as by-products in the mining of barite. The barite and associated minerals are believed to have been derived from solutions of deep seated igneous origin. Mining, milling, and prospecting are reviewed. Individual deposits are described by counties and located on a sketch map of central Kentucky.

110 Ross, C. P., 1941, The metal and coal mining districts of Idaho, with notes on the nonmetallic mineral resources of the state: Idaho Bur. Mines and Geology Pamph. 57, p. 101–102.

The occurrence of barite in large veins at the Sun Valley mine near Hailey, Blain County is briefly noted. Another deposit near Muldoon, Blain County is reported. Smaller and less pure deposits are said to occur in Paleozoic and other sedimentary rocks in Custer County and elsewhere.

111 Rowe, J. P., 1908, Barytes deposits in Montana: Mining World, v. 28, no. 16, p. 637.

A barite deposit two miles southwest of Missoula is described as "the only one of commercial value in the State." A vein from two to three feet wide containing massive, quite pure barite crops out for several hundred feet. Near the head of Cabin Creek, 23 miles southeast of Ekalaka, Custer County, small spheroidal nodules of barite associated with selenite occur in the residual clay of the Fox Hills formation [Cretaceous]. Layers very rich in nodules have been traced for over one-half mile. Wine colored crystals of barite were found in the Fox Hills formation about 25 miles from mouth of Cedar Creek, Dawson County.

112 Rowe, J. P., 1928, Minor metals and non-metallic minerals of Montana: Eng. and Min. Jour., v. 125, no. 20, p. 816.

Commercial deposits of barite were unknown in Montana in 1928. Near Missoula, two deposits (Pattee Canyon and Rattlesnake Creek) of quite pure, massive white barite associated with specular hematite may be of economic importance. A non-commercial occurrence of barite nodules in Upper Cretaceous clays of Wibaux County is noted.

113 Santmyers, R. M., 1930, Barite and barium products, part 1, general information: U. S. Bur. Mines Inf. Circ. 6221, 55 p.

Barite deposits in the United States and methods of mining, washing, and milling of barite are described. Domestic and foreign production of barite is discussed. Foreign deposits are briefly described. Imports, exports, consumption, and the condition of the barite industry in 1928 are summarized.

114 Santmyers, R. M., 1930, Barite and barium products, part 2, barium products: U. S. Bur. Mines Inf. Circ. 6223R, 26 p.

General information on barium products is given. Preparation, uses, production, markets, imports and exports of ground barite, lithopone, and barium chemicals are discussed. On the map are shown the location of barite deposits and plants making barium products in United States.

115 Schrader, F. C., Stone, R. W., and Sanford, Samuel, 1917, Useful minerals of the United States: U. S. Geol. Survey Bull. 624.

The more important occurrences of useful minerals, including barite, are listed by states. Some of the deposits are very briefly described.

116 Shannon, E. V.. 1926, The minerals of Idaho: U. S. Natl. Mus. Bull. 131, p. 442–444.

Barite occurrences in Idaho are listed and very briefly described. Barite is found principally as a gangue mineral in metallic ore deposits of nine counties. A deposit now known as the Sun Valley barite mine, Blaine County, is the only one of commercial importance.

117 Sharp, W. N. and Pray, L. C., 1952, Geologic map of bastnaesite deposits of the Birthday claims, San Bernardino County, California: U. S. Geol. Survey Mineral Investigations Map MF–4.

An area 900 by 1,500 feet is shown on the geologic map of the Birthday claims near Mountain Pass where "considerable quantities" of bastnaesite, a rare-earth mineral, were discovered in 1949. Pre-Cambrian metamorphic rocks are cut by younger shonkinite which forms the host rock for most of the barite-rich carbonate veins. The veins range up to 18 feet in thickness. One vein contains either a new mineral or a variety of barite which is a sulfate of barium and strontium containing rare earths.

118 Smith, E. A., and McCalley, Henry, 1904, Index to the mineral resources of Alabama: Ala. Geol. Survey Bull. 9, p. 62–63.

White barite partly stained with iron oxides occurs as irregular masses in residual clay derived from the Trenton limestone [Ordovician] near its con-

contact with the Knox dolomite [of Cambrian and Ordovician] age. Important occurrences are reported near Tampa, Calhoun County, near Greensport, St. Clair County, near Maquire Shoals on the Little Cahaba River, at the "Sinks" on Six Mile Creek, and near Pratt's Ferry in Bibb County. No production was reported from these deposits in 1904.

119 Soulé, J. H., 1946, Exploration of Gallinas fluorspar deposits, Lincoln County, N. Mex., U. S. Bur. Mines Rept. Inv. 3854, p. 4–5.

Barite is an important constituent of fluorite veins and mineralized breccia zones in predominantly quartzitic sandstone of Permian age of the the Gallinas Mountains. Some of the deposits contain as much as 37 percent barite.

120 Stern, A. G., 1941, Role of clay and other minerals in oil-well drilling fluids: U. S. Bur. Mines Rept. Inv. 3556, 88 p.

The cost, functions, and use of drilling muds are discussed in detail. Tests for evaluating the properties of drilling muds also are given in detail. The operation of a drilling mud system for an oil well and the materials used for drilling muds are described. Weighting materials are used to maintain sufficient hydrostatic pressure in the drill hole to confine gas, oil, and water to the rock strata. Weighting materials should permit the drilling fluid to attain a low viscosity and high specific gravity without being corrosive or toxic. Materials which have been used or considered for weighting muds include barite, celestite, iron oxide, pulverized iron, silica flour, and lead and mercury compounds. Of these materials barite is the most satisfactory; it is insoluble in water, chemically inactive, and makes a low viscosity suspension when mixed with an equal volume of water. The bibliography contains references to 138 papers about drilling mud.

121 Stoddard, Carl, 1932, Metal and nonmetal occurrences in Nevada: Nev. Univ. Bull. v. 26, no. 6, p. 93–94.

Ten occurrences of barite in Nevada are listed, but not described. Location and references are given where available.

122 Stone, R. W., 1939, Non-metallic minerals: Pa. Geol. Survey Bull. M 18 C, p. 5–9.

In Franklin County near Waynesboro and Chambersburg, barite occurs in small lumps in residual clay derived from limestone, and in thin veins in one limestone outcrop. A few small pits remain where barite was mined years ago. A small amount of barite was mined about 1880 from a deposit near Fort Littleton, Fulton County but it was abandoned because of the high content of iron. A small deposit was reportedly mined near Buckmanville in Bucks County. None of these deposits appears to be of commercial value.

123 Stuckey, J. L., 1942, Barite deposits in North Carolina, *in* Newhouse, W. H., and others, Ore deposits as related to structural features, p. 106–108: Princeton, N. J., Princeton Univ, Press.

The barite deposits and their localization along certain regional structures is discussed. In the Hot Springs district, barite occurs in irregular veins and lenses along two major thrust fault zones between the pre-Cambrian Max Patch granite and the Cambrian Snowbird formation. The faulting took place during the building of the Appalachian mountains in the late Paleozoic. Hydrothermal solutions emanating from granitic intrusions ascended along these fractures and deposited the barite and associated minerals. Highly metamorphosed crystalline rocks of the Kings Mountain and

Hillsboro district have a well defined schistosity which strikes northeast and dips steeply northwest. Barite occurs in veins or elongated lenticular masses parallel to the schistosity. The deposits appear to have been formed by deposition from hydrothermal solutions of magmatic origin which ascended along prominent cleavage planes after the last period of regional metamorphism in the late Paleozoic.

124 Stuckey, J. L., and Davis, H. T., 1935, Barite deposits in North Carolina: Am. Inst. Min. Metall. Engineers Trans., v. 115, p. 346–355.

Deposits in the Hot Springs, Kings Mountain, and Hillsboro areas, North Carolina are described. The first two areas had produced about 300,000 tons of barite by 1933 and were estimated to have fairly large reserves. The barite occurs in irregular veins and lenses in pre-Cambrian and Cambrian crystalline rocks. The mineralogy and petrography of the barite veins and lenses is described, and evidence indicates that the deposits were formed by hydrothermal solutions of magmatic origin. Associated minerals include quartz, fluorite, sericite, calcite, pyrite, galena, chalcopyrite, and sphalerite. Mining and reserves in the Hot Springs and Kings Mountain areas are briefly discussed.

125 Symons, H. H., and Davis, F. F., 1952, Mineral commodities in California during 1950: Calif. Jour. Mines and Geology, v. 48, no. 4, p. 311.

Properties in Kern and Plumas Counties yielded all of the production of barite in California in 1950. Barite from Kern County was used in oil well drilling, and that from Plumas County for the manufacture of barium chemicals.

126 Tarr, W. A., 1918, The barite deposits of Missouri and the geology of the barite district: Univ. Missouri Studies, Science Series, v. 3, no. 1, 111 p.

Barite deposits in the Washington County and Central districts of southeastern and central Missouri are listed. History, geography, geology, occurrence, origin, and economic importance of the deposits are reviewed. The more important Washington County district is discussed in detail and shown on a geologic map. Rocks of the Washington County district are largely dolomites of Cambrian age and dip gently to the north, northwest, and west. The nearly horizontal sedimentary rocks of the Central district are Cambrian, Ordovician, Mississippian and Pennsylvanian in age. Barite in the Washington County district is associated with the Potosi and overlying Proctor dolomites and in the Central district with the Gasconade, Roubidoux, and Jefferson City formations. Four types of deposits are recognized: veins, disseminated deposits, solution cave deposits, and residual deposits. The small veins are closely associated with irregular disseminations of barite in the dolomite. These deposits are not of economic importance. Solution caves or circle deposits are most common in the Central district. Residual deposits derived by weathering of primary deposits in the underlying dolomite are by far the most important commercially. They contain barite fragments associated with limonite and drusy quartz or chert distributed through deep red clay. The barite and associated minerals in the primary deposits are believed to have been deposited at shallow depth by ascending hot waters of magmatic origin. In 1918 all barite mining in Missouri was done by hand from small open pits about 4 or 5 feet deep. Preparation of the barite for market is briefly described.

127 Tarr, W. A., 1919, The barite deposits of Missouri: Econ. Geology, v. 14, no. 1, p. 46–67.

The geology and origin of the barite deposits of Missouri are discussed. This paper summarizes material presented in detail in Missouri reference 11.

128 Tarr, W. A., 1932, A barite vein cutting granite of southeastern Missouri: Am. Mineralogist, v. 17, no. 9, p. 443–448.

A small fissure vein in granite near Graniteville, Iron County, Missouri is described. The vein filling consist of barite, pyrite, and fluorite possibly deposited by hydrothermal solutions of magmatic origin which ascended along a fault plane. The discovery of this vein in granite about 20 miles south of the Washington County barite district indicates that the primary barite in the latter region also might have had a magmatic source.

129 Tillia, H. J., 1951, Scraper assembly cuts costs at open pit barite mine: Eng. and Min. Jour., v. 152, no. 8, p. 78–79.

The slusher mining plan adopted by Barium Products, Ltd. for developing the Valley View barite claims 28 miles south of Battle Mountain, Nev., is reviewed. This deposit, in production for two years as of 1951, is described as an "erosional remnant of a massive replaced limestone bed, probably of Pennsylvanian age." The operators plan to start production at the larger Mound Springs deposit in the same area after the smaller Valley View deposit has been mined out.

130 Tucker, W. B., and Sampson, R. J., 1938, Mineral resources of Inyo County: Calif. Jour. Mines and Geology, v. 34, no. 4, p. 481–482.

A considerable tonnage of barite is reported to have been shipped from the Gunter Canyon deposit six miles northeast of Laws in 1928 and 1929. The barite occurs in a series of parallel veins in Cambrian slates and schists. At the Poso Barytes deposit, Tulare County, 15 miles west of Linnie, barite occurs in three parallel veins averaging 20 feet in width and traceable for over 4,000 feet. The veins occur along a shear zone in quartz diorite. In 1938 this deposit was owned and developed with an adit by the Western Barium Corporation. A barite outcrop 6 to 8 feet wide in Warm Springs Canyon 45 miles west of Shoshone was discovered in 1937 and was being developed in 1938.

131 Uhley, R. P. and Sharon, Le Roy, 1954, Gravity surveys for residual barite deposits in Missouri: Am. Inst. Min. Metall. Engineers, v. 6, no. 1, p. 52–56.

Gravimetric surveying for barite in Washington County is discussed. Large commercial bodies can be outlined and the tonnages of ore computed with an error of 35 percent, or less.

132 Ulrich, E. O., and Smith, W. S. T., 1905, The lead, zinc, and fluorspar deposits of western Kentucky: U. S. Geol. Survey Prof. Paper 36, p. 135 and 156.

Vein deposits of western Kentucky contain fluorite and calcite with some barite, and smaller amounts of galena and sphalerite and other oxidation products. Few veins consist predominantly of barite: those with predominant barite are generally too small or too intermixed with gangue to be of commercial value.

133 Umpleby, J. B., and others, 1930, Geology and ore deposits of the Wood River region, Idaho with a description of the Minnie Moore and nearby mines: U. S. Geol. Survey Bull. 814, p. 112–113 and 160–161.

The Bonnie and Barium Sulphate claims (now Sun Valley barite mine), are described. Barite occurs in a series of lenticular masses, at one place over 50 feet thick, trending northwest in calcareous beds of the Wood River formation. [Pennsylvanian]. The barite is generally white, banded, and free from visible impurities except small grains of pyrite and associated stains of iron oxide. In 1923, workings consisted of an 840-foot adit and a shallow open cut from which a carload of barite was shipped in 1922. Barite has not been found in other ore deposits of the region. The source of the barium may have been emanations given off during the last stages of deep seated igneous activity.

134 United States Bureau of Mines, 1924–31: Mineral resources of the United States.

These annual publications list statistics on barite production, consumption, uses, prices, imports, and exports. Domestic production is generally reviewed by States. Current developments in the barite industry are noted briefly.

135 United States Bureau of Mines, 1932–52: Minerals Yearbook.

These annual publications list statistics on barite production consumption, uses, prices, imports, and exports. Domestic production is generally reviewed by states. Current developments in the barite industry are noted briefly.

136 United States Geological Survey, 1882–1923: Mineral resources of the United States.

These annual publications list statistics on barite production, consumption, uses, prices, imports, and exports. Domestic production is generally reviewed by states. Current developments in the barite industry were noted briefly.

137 Valentine, G. M., 1949, Inventory of Washington minerals; Part 1, nonmetallic minerals: Wash. Dept. Conserv. Dev., Div. Mines and Geology Bull. 37, p. 11.

Twenty-two occurrences of barite are described. Most of these are in Stevens County where several deposits appear to be of commercial value. Production was reported from three mines near Springdale in southern Stevens County in 1938 and 1942. Other occurrences are in Mason, Okanogan, Ferry, and Pend Oreille counties. Deposits are located on a map of the state and briefly described and evaluated.

138 Vanderburg, W. O., 1938, Reconnaissance of mining districts in Eureka County, Nevada: U. S. Bur. Mines Inf. Circ. 7022, p. 64.

A barite deposit in Eureka County in the NE¼ of sec. 27, T. 34 N., R. 51E. has been worked since 1938. Massive and relatively pure barite in veins averaging 10 feet in width and dipping 70° east occur in shale. This barite is marketed on the Pacific Coast.

139 Vanderburg, W. O., 1939, Reconnaissance of mining districts in Lander County, Nevada: U. S. Bur. Mines Inf. Circ. 7043, p. 53–54 and 79.

Four barite deposits at the northern end of the Shoshone Range and one near Austin are described. The bedded deposit at the Nevada mine four miles southeast of Argenta is at least 60 feet thick. This deposit is mined from an open cut and is probably one of the largest in Nevada; about 6,000 tons were shipped during the summer of 1937. About 4,500 tons were shipped from the Valley View mine. In the vicinity of Lewis Canyon, barite occurs in a vein up to 20 feet wide. Barite is associated with silver-lead ores at the Starr Grove Mine. In the Reese River district, about 9½ miles southeast of Austin, good quality barite occurs in a series of flat dipping veins in decomposed monzonite. The veins average four feet in width.

140 Vanderwilt, J. W., 1947, Metals, nonmetals, and fuels, *in* Pt. 1 of Mineral resources of Colorado: Colo. Min. Res. Board [Bull.] p. 255–256.

Occurrences of barite in Colorado, most of which are not of economic value, are listed. Barite occurs as a common gangue mineral in many metal mining districts in the state. A small amount was produced from veins in the granite of the Wet Mountains near Ilse, Custer County. Occurrences are reported in Boulder, Custer, Grand, Gunnison, Mesa, Ouray, Park, Pitkin, and San Miguel counties. A bibliography is included.

141 Van Horn, E. C., 1949, New barite possibilities revealed in the Carolinas: Eng. and Min. Jour., v. 150, no. 1, p. 76–78.

The material presented in the paper by Van Horn, Le Grand, and McMurray (1949) is reviewed briefly.

142 Van Horn, E. C., Le Grand, J. R., and McMurray, L. L., 1949, Geology and preliminary ore dressing studies of the Carolina barite belt: N. C. Dept. Conserv. Devel., Div. Mineral Res. Bull. 57, 25 p.

The geologic occurrence, origin, history of development, and commercial possibilities of the barite deposits of the Kings Mountain-Gaffney area are discussed. Mines and prospects in the area are described and spotted on a map. The deposits form a narrow, irregular belt which extends northeast for about 24 miles from a point about five miles southeast of Gaffney, South Carolina to the northeast slope of Crowder's Mountain four miles east of the town of Kings Mountain, North Carolina. The barite is found only in a zone of quartz-sericite schist near the contact between the Bessemer granite and the Battleground schist and occurs in veins and small lenticular disseminations as much as one inch or more across which are sub-parallel to the foliation of the host rock. Some disseminations form as much as 20 percent of the rock. The barite possibly was deposited by ascending hydrothermal solutions as interstitial fillings along foliation planes and as replacements of quartz and sericite in the schist. Barite has been produced from the veins intermittently since the early 1880's, but the total production has been small. Laboratory tests indicate that the disseminated ore is amenable to concentration by flotation. The Carolina barite belt may contain reserves of commercial importance which can be mined by open-cut methods.

143 Watson, T. L., and Grasty, J. S., 1915, Barite of the Appalachian States: Am. Inst. Min. Metall. Engineers Bull. 98, p. 345–390; and 1915, Trans. Am. Inst. Min. Metall. Engineers, v. 51, p. 514–559.

The barite deposits of Alabama, Georgia, Kentucky, Maryland, North Carolina, Pennsylvania, South Carolina, Tennessee, and Virginia are described. The occurrence, mining, beneficiation, production, and uses of barite are discussed. This paper summarizes much of the information available in the literature up to 1914 on deposits in the Appalachian states.

144 Weigel, W. M., 1923, Barite and ocher in the Cartersville, Georgia, district: U. S. Bur. Mines Rept. Inv. 2477, p. 1–7.

Ore deposits contain barite imbedded in clay as irregular pieces ranging in size from fine grains to masses weighing several hundred tons. The barite is concentrated in pockets or steps on hillsides and overlies quartzite or partly weathered limestone from which the deposits have been derived. Methods of prospecting, mining, and milling are described.

145 Weigel, W. M., 1929, The barite industry in Missouri: Am. Inst. Min. Metall. Engineers Tech. Pub. 201, 26 p.; Trans. 1929, Year Book, p. 256–279; Pit and Quarry, v. 18, no. 13, p. 87–96.

Production of barite in Missouri and the United States from 1913–1927 and the economic condition of the barite industry in Missouri in 1928 is briefly discussed. A description of the general geology and ore deposits of the Washington County and Central districts is given. Mining, milling, and prospecting methods are also described and a short discussion on reserves, marketing and uses of Missouri barite is included. In Washington County, primary barite in veins, disseminations, and solution cavities occurs chiefly in the Potosi dolomite of Cambrian age. Residual deposits consisting of barite fragments embedded in clay are by far the most important commercially. Similar but smaller and higher grade residual deposits occur in the Central district. Future production of barite in Missouri is predicted to exceed past production which totaled 1,750,000 tons as of 1928. Hand mining in open pits accounted for well over half of the production in 1928. Power shovels and mechanical washing and concentrating methods have been in use for only four or five years. In 1928, most Missouri barite was marketed in St. Louis, Illinois and the Ohio Valley.

146 Weissenborn, A. E., 1948, Barite, *in* Weissenborn, A. E., and Stenzel, H. B., and others, Geological resources of the Trinity River tributary area in Oklahoma and Texas: Tex. Univ. Pub. 4824, p. 67–71.

The uses, specifications, and prices of barite are noted. Occurrences in central and southwestern Oklahoma and the adjacent area in northeastern Texas are described. Barite occurs in thin irregular veins or in scattered nodules in Permian and Triassic shales. Of these deposits, possibly two residual occurrences, in southwestern Oklahoma might be of commercial value. The larger of these is about five miles south of Cache, and is estimated to contain several thousand tons of barite concentrated on gulley floors in Permian shale. Residual barite is found in brown clay and limonite derived from weathering of dolomite in the Arbuckle limestone of Cambrian and Lower Ordovician age of the Arbuckle Mountains. Total production of barite in the State to 1948 has amounted to less than 500 tons. A bibliography and a map showing the location of the deposits is included.

147 Whitlatch, G. I., 1937, Barite: Tenn. Dept. Conserv. Div. Geology, Markets Circ. 7, 25 p.

The minerals of barium, occurrences in the United States, specification for market, markets, prices and uses are reviewed with emphasis on Tennessee ores. A brief description of barite deposits in Tennessee is given which includes the Sweetwater and Del Rio districts and the Greene County area in east Tennessee; the Pall Mall district in Fentress County and other occurrences in Davidson, De Kalb, Dickson, Smith, Trousdale, and Wilson Counties in middle Tennessee. The history of the barite industry in Tennessee is summarized with a table showing production in selected years between 1903 and 1931. A brief statement on prospecting for barite in Tennessee is included.

148 Williams, F. J., 1949, Barium minerals, *in* Industrial minerals and rocks, p. 77–94: Am. Inst. Min. Metall. Engineers, New York.

A summary of general information on barite including occurrence, distribution, production, uses and markets is given. The principal deposits in the United States and foreign countries are briefly described. Mining, prospecting, and concentration methods are listed. Workable deposits are chiefly of two types: veins of total or partial replacement of dolomite and limestone; and residual concentration in clay derived by weathering of preexisting deposits like those of type 1. The principal deposits in the United States are in Arkansas, Missouri, Georgia, Tennessee, California, and Nevada. The principal foreign deposits are in Canada, Germany, Italy, Great Britain, and the U. S. S. R.

149 Wilson, E. D., 1933, Geology and mineral deposits of southern Yuma County, Arizona: Ariz. Bur. Mines, Geol. Ser. 7, Bull. 134, p. 42 and 152–153.

Barite is an abundant gangue mineral in veins of the Silver, Castle Dome, Sheep Tanks, and Neversweat districts. Relatively pure veins of barite occur in the Mohawk, Neversweat, and Silver district. At the Renner mine northwest of Mohawk, barite has been mined from an open cut on the widest part of a narrow vein cutting granitic gneiss. The barite is enclosed in manganiferous calcite. Eighteen carloads of barite were shipped from this deposit in 1929 and 1930.

150 Wilson, E. D., Moore, R. T., and Roseveare, G. H., 1953, Nonmetallic mineral map of Arizona: Ariz. Bur. Mines.

The map shows the location of barite and other nonmetallic mineral deposits.

151 Wilson, E. D., and Roseveare, G. H., 1949, Arizona nonmetallics; a summary of past production and present operations: Ariz. Bur. Mines, Mineral Technology Ser. 42, Bull. 155, p. 10–11.

Barite is a common gangue mineral in veins of metallic ores in Arizona. Deposits of commercial importance occur as veins in which barite is associated chiefly with calcite or fluorite and relatively few other minerals. Total production of barite in Arizona has been small. Figures are available only for 1931–1932 when output was 3,410 tons. Most of the production has been from the Christman property northeast of Mesa now operated by the Arizona Barite Co. A few carloads were shipped in 1929 and 1930 from the Renner deposit and in 1938 from the Ernest Hall property. Both deposits are in Yuma County.

152 Winston, W. B., 1949, Barium: Calif. Jour. Mines and Geology, v. 45, no. 1, p. 85–97.

The properties of barium, barium compounds, and barium ores are reviewed. General information is summarized: occurrence and location of deposits, prospecting, mining, preparation for market, uses, marketing, and preparation of barium compounds. Brief notes on barite occurrences in the following counties of California: Inyo, Los Angeles, Mariposa, Monterey, Nevada, Plumas, San Bernardino, Santa Barbara, Shasta, and Tulare. Production of barite in the State in 1945 was from three properties, one each in Mariposa, Nevada, and Plumas Counties. Production during 1944–1945 was about 68,000 tons.

153 Woodward, H. P., 1932, Geology and mineral resources of the Roanoke area, Virginia: Va. Geol. Survey Bull. 34, p. 134–135.

A barite vein in pre-Cambrian crystalline rock three miles northwest of Thaxton has been mined in an opencut 20 feet deep and 450 feet long. A barite deposit two miles northeast of Roanoke occurs as a replacement in the Elbrook [formation of Cambrian age] and as irregular nodules in clay residually derived from the limestone. The barite mined from shallow opencuts was shipped for use in the sugar industry.

154 Woodward, H. P., 1938, Outline of the geology and mineral resources of Russell County, Virginia: Va. Geol. Survey Bull. 49, p. 69–72.

Deposits in Russell and Tazewell Counties were the chief sources of barite in Virginia in 1906. All of the deposits examined by the writer in 1938 appeared to be exhausted. The barite occurs as veins and replacements in the upper members of the [Ordovician] Beekmantown dolomite or in residually derived clay. The Hubbard, Leonard, and Little River mines are briefly described.

155 Wright, L. A., and others, 1953, Mines and mineral deposits of San Bernardino County, California: Calif. Jour. Mines and Geology, v. 49, nos. 1 and 2, p. 155 and nos. 133–135 in tabulated list of mines and mineral deposits included at end of report.

Occurrences of barite, chiefly in veins in igneous and metasedimentary rocks, are widespread in San Bernardino County. Several deposits in the Grapevine, Calico, and Lavic districts, were mined during 1910 to 1912 and 1929 to 1937. Barite has been recovered from mill tailings in the Calico district and interest has been shown recently in recovering barite as a byproduct from the rare earth deposit at Mountain Pass. A tabulation at the end of the report includes 13 barite deposits which are briefly described as to location, geology, development, and production. A bibliography is included for each deposit. The three major deposits, the Barium Queen, Hansen, and Lead Mountain mines, are included on a map showing the location of mines and mineral deposits in San Bernardino County.

156 Zapp, Alfred, 1941, Barite in northern Llano County: Tex. Univ. Bur. Econ. Geology Min. Res. Circ. 35, 6 p.

A small tonnage of residual barite has been mined from a deposit in northern Llano County. Most of the residual material has been removed, and the underlying primary deposits contain impure barite in a series of irregular thin veins in pre-Cambrian schist and gneiss. The veins are roughly parallel to the foliation of the country rock; they pinch and swell abruptly. The deposits seem to be small.

157 Anonymous, 1952, A visit to the Mountain Pass rare-earth enterprise: Eng. and Min. Jour., v. 153, no. 10, p. 87.

The exploration, mining, and milling of the rare-earth deposits at the Sulphide Queen near Mountain Pass, Calif., are described briefly. The deposit is said to cover about 20 acres. The barite forms about 20 percent of the lode, although barite locally constitutes more than 50 percent of some masses. Overburden is negligable; ore is mined in open pits. The flotation mill, opened in February 1952, has a capacity of 100 tons a day and is now daily processing 70 tons of ore containing recoverable rare-earth minerals and barite.

158 Anonymous, 1947, Arizona barite: Mining World, v. 9, no. 1, p. 20–22.

The mine of the Arizona Barite Co. at Coon Bluff 22 miles northeast of Mesa is described. In 1946, it was producing 100 tons of ground barite per day. Barite occurs in fissure veins in volcanic agglomerate. Production as of January 1947 had been derived solely from the main vein about 15 feet wide and 3,000 feet long that had been opened to a depth of 140 feet. The final product, which contains about 94 percent $BaSO_4$ and has a specific gravity of 4.0 or higher, is shipped mainly to oil fields of the Southwest and West Coast for use in drilling mud. Plans call for development of other veins in the area. The operators also plan to install flotation equipment to produce a higher grade product and permit recovery of silver, said to run about 3.2 ounces per ton.

159 Anonymous, 1953, Socorro County produces barite: New Mexico Miner, v. 15, no. 1, p. 2.

Production of barite in 1952 from the Mex-Tex Mining Co. property in Socorro County is discussed. Ore is mined in open pits and trucked 35 miles to a company-owned mill at San Antonio, New Mexico where concentrates are bagged and shipped for use in drilling muds in Texas and New Mexico. The management is considering expanding present operations because of new ore strikes on the property.

160 Anonymous, 1952, Southern California's rare-earth bonanza; Eng. and Min. Jour., v. 153, no. 1, p. 100–102.

The recent discovery and exploration of Birthday and Sulphide Queen deposits of rare-earth minerals near Mountain Pass are discussed. Rare-earth values at the Birthday deposits are said to have diminished rapidly at very shallow depth. The Sulphide Queen deposit is described as a "massive lode, about 20 acres in area, of barite-carbonate rock", which in addition to rare-earth carbonates, celestite, calcite, and silica contains barite which locally constitutes the bulk of the rock and averages 20 percent of the entire lode. Successful methods for separating rare-earth material from barite are described.

The Molybdenum Corporation of America, owners of the property, planned to start production about February 1, 1952.

161 Anonymous, 1953, This month in mining: Eng. and Min. Jour., v. 154, no. 6, p. 148.

As of April 1951, mining and milling are reported at a high grade barite deposit near Elk Creek in the vicinity of Greenough, Missoula County, Mont. Production is reported to be 12 to 14 cars of pulverized barite and 4 to 6 cars of crushed barite per week.