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MOM2
no. 37

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

*Mineral investigations resource map,
MR series; text*

TO ACCOMPANY MAP MR-37

HIGH-ALUMINA KAOLINITIC CLAY IN THE UNITED STATES

(Exclusive of Alaska and Hawaii)

By Helen R. Mark



Introduction

The general distribution of high-alumina kaolin-
itic clay deposits in the United States (exclusive of
Alaska and Hawaii) is shown on the accompanying map.
The locations of mines, pits, and prospects are shown
by appropriate symbols. Certain clay-bearing areas
are shown by patterns that designate the geologic age
of the deposits. The locations are numbered consecu-
tively by states and are keyed to an index which lists
the name of the deposit, county, and principal refer-
ences. Only significant references on the size, quality,
and geologic occurrence of deposits are listed. Some
of the data for the map and index were compiled by
John W. Hosterman and the late Leona Boardman.

The deposits shown on the map are, for the most
part, restricted to kaolinitic clays that contain 20 per-
cent alumina or more; however, in certain parts of the
clay-bearing areas outlined on the map, the clay prob-
ably contains less than 20 percent alumina. Results of
many investigations of clay deposits were published
before the mineralogy of clays was understood, and the
chemical compositions of many clay deposits are inad-
equately described in geologic reports. Therefore,
some deposits of impure kaolins as well as deposits
of clay minerals other than those of the kaolin group
may have been included.

Clays are composed of very small crystalline
particles of one or more members of a group, or
groups of clay minerals. These minerals consist of
hydrous aluminum, magnesium, and iron silicates
which may contain calcium, potassium, and other ions,
plus nonclay minerals. Most clays are plastic when
wet. A few clays are composed of a single clay min-
eral with few impurities, but many are mixtures of
clay minerals and contain appreciable amounts of
quartz and other nonclay minerals. Most of the high-
alumina clays are composed predominantly of minerals
of the kaolin group, of which kaolinite is the most
common. The kaolin clays are hydrous aluminum sili-
cates with the general composition of $\text{Al}_4\text{Si}_4\text{O}_{10}(\text{OH})_8$.

Most high-alumina clays are ceramic clays, and
because of their special industrial applications, are
known and named after their products or uses, for ex-
ample, whiteware clay, refractory clay, and stoneware
clay. Other uses include paper coating, and fillers for
paint and rubber. The various physical properties
which control the uses of clays include particle size,
plasticity, green and dry strengths, shrinking, warp-
ing, bloating and cracking characteristics with drying
and firing, color both before and after firing and in

powdered form, and type and amount of nonclay min-
erals. Detailed explanations of the relation of the chem-
istry and mineral structure of clays to their physical
properties and their uses are given by Grim (1953 and
1962).

Most of the high-alumina kaolinitic clay deposits
shown on the map are of Pennsylvanian, Cretaceous,
and Tertiary age. The clays of Pennsylvanian age are
associated with coal beds in Pennsylvania, Ohio, Ken-
tucky, Missouri, Indiana, Illinois, Maryland, and West
Virginia and in other coal-producing states. Clay de-
posits of Late Cretaceous and Tertiary age occur in a
belt that extends from South Carolina, across Georgia,
central Alabama, northeastern Mississippi, western
Tennessee and Kentucky, southern Arkansas, and the
eastern and southern parts of Texas. Some of these
deposits are associated with bauxite. Other clay de-
posits of Cretaceous age occur in New Jersey, eastern
Maryland, Kansas, Colorado, South Dakota, Utah, and
New Mexico. Clays of Tertiary age occur in Vermont,
New Jersey, Florida, California, western Oregon,
eastern Washington, northern Idaho, and Colorado.

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ALABAMA

[General references: McCalley, 1897;
McVay, 1938; Ries, and Smith, 1900]

Locality

Marion County

1. Chalk Bluff. Bramlette and McVay, 1940; Ries,
1900b; Smith, E. A., 1892
2. Pearce's Mill area. Bramlette and McVay, 1940;
Ries, 1900b.

Walker, Lawrence, Winston, Cullman, Fayette, Jeffer-
son, and Tuscaloosa Counties.

3. Warrior coal field area. McVay and Toulmin,
1945.

Dekalb County

4. Fort Payne area. Bramlette and McVay, 1940;
Ries, 1900b.
5. Eureka mines, Valleyhead area. Jones, 1926;
Ries, 1900b.

ALABAMA (cont'd.)

Cherokee County

6. Rock Run area. Jones, 1926; Ries, 1900b.

Calhoun County

7. Peaceburg. Jones, 1926; Ries, 1900b.

Talladega County

8. Kymulga area. Jones, 1926; Ries, 1900b.

Randolph County

9. Milner area. Jones, 1926; Ries, 1900b.

ARKANSAS

[General references: Funnell, 1950; Tracey, 1944; Williams and Plummer, 1951]

Pulaski County

1. Fourche Mountain district, Rauch clay deposit. Branner, 1908; Smothers and Dziemianawicz, 1951.
2. Mabelvale district. Arkansas Geol. Survey, 1942; Branner, 1908.

Saline County

3. Bauxite area. Arkansas Geol. Survey, 1942; Branner, 1908.

Hot Spring County

4. Perla area. Branner, 1942.

Pike County

5. Pike County kaolin district, Kanatzer Hill. Kerr and Kulp, 1949; Herold and Heyl, 1942.
6. Vaughn creek. Branner, 1908; Herold and Heyl, 1942.

Ouachita County

7. Lester area. Branner, 1908; Branner, 1942; Ries, Bayley, and others, 1922.

CALIFORNIA

[General references: Boalich and others, 1920; Dietrich, 1928a, b; 1940; Eakle, 1923, Linton, 1928; McLenegan, 1956]

Humboldt County

1. Eureka. Laizure, 1925.

Placer County

2. Lincoln area. Dietrich, 1928b; Hodge, 1938; Logan, 1927.

Amador County

3. Ione area. Aubury, 1906; California Div. Mines; 1956; Cleveland, 1957; Johnson and Ricker, 1948; Dietrich, 1928b; Pask and Turner, 1922; Turner, 1950; 1954.

Sonoma County

4. Beltane. Dietrich, 1928b; Eakle, 1923; Laizure, 1925.

CALIFORNIA (cont'd.)

Alameda County

5. Tesla. Dietrich, 1928b; Hodge, 1938.

Riverside County

6. Alberhill area. Burchfiel, 1923; Daviess and Bramlette, 1942b; Dietrich, 1928b; Hill, 1923; Stauffer, 1945; Sutherland, 1935.

Orange County

7. Goat Ranch. Burchfiel and Mulryan, 1940; Dietrich, 1928b; Sutherland, 1935.
8. El Toro. Dietrich, 1928b; Sutherland, 1935.
9. O'Neill Ranch, San Juan Capistrano area. Daviess, and Bramlette, 1942a; Dietrich, 1928b.

San Diego County

10. Cajon Mountain. Dietrich, 1928b.

Imperial County

11. Full Moon clay deposit. Dietrich, 1928b.

COLORADO

[General references: Argall, 1949; Aurand, 1920; Larrabee and others, 1947; Shaler and Gardner, 1907; Vanderwilt, 1947; Waag , 1947, 1952b, 1961]

Las Animas County

1. Juan Baca Canyon. Stose, 1912.

Huerfano County

2. Cuchora Canyon. Waag , 1953.
3. Capers. Waag , 1953.

Pueblo County

4. Beulah district. Waag , 1953; Van Sant, 1959.
5. Turkey Creek district. Waag , 1947, 1953; Van Sant, 1959.

Custer County

6. Wetmore area. Waag , 1953; Van Sant, 1959.

Fremont County

7. Penrose district. Waag , 1953; Van Sant, 1959.
8. Canon City district. Waag , 1947, 1953; Van Sant, 1959.

Gunnison County

9. Gunnison. Butler, 1915.

Garfield County

10. Glenwood Springs area. Butler, 1915; Van Sant, 1959.

Jefferson County

11. Golden district. Butler, 1915; Emmons, and others, 1896; Geijsbeek, 1906; Ries, 1927; Waag , 1952a, 1961.

El Paso County

12. Calhan area. Richardson, 1911; Van Sant, 1959.

CONNECTICUT

Litchfield County

1. West Cornwall deposit. Loughlin, 1905; Ries, 1903; Ries, Bayley, and others, 1922; Sohon, 1951.

DELAWARE

New Castle County

1. Hockessin. Matson, 1912; Ries, 1903; Ries, Bayley, and others, 1922.
2. Newark. Matson, 1912; Ries, 1903; Ries, Bayley, and others, 1922.

FLORIDA

[General reference: Matson, 1909]

Santa Rosa County

1. Y. P. S. Tract, Milton area. Calver, 1949.

Walton County

2. Weller property, Dorcas and Dearland area. Bell, 1924; Calver, 1949.
3. Thompson property, De Funiak Spring area. Bell, 1924; Calver, 1949.

Washington County

4. Chalk Bluff, Vernon area. Bell, 1924; Calver, 1949, 1957.

Jackson County

5. Seale's property, Round Lake area. Calver, 1949, 1957.

Clay County

6. Foremost properties, Keystone Height area. Bell, 1924; Calver, 1949.

Putnam County

7. Edgar area. Bell, 1924; Calver, 1949, 1957.

Marion County

8. Owens property, Ocala area. Calver, 1949, 1957.
9. Moss Bluff, Ocala area. Calver, 1949, 1957.

Lake County

10. Irwin property, Umatilla area. Calver, 1949, 1957.
11. Okahumpka area. Calver, 1949, 1957; Sellards, 1918.

Polk County

12. Bartow Junction (Lake Alfred), Lakeland area. Bell, 1924; Sellards, 1918.

GEORGIA

[General references: Burgess, 1953; Kesler, 1951, 1957; Klinefelter and others, 1943]

GEORGIA (cont'd.)

Floyd County

1. Hermitage district. Veatch, 1909; Butts and Gildersleeve, 1948.
2. Cave Springs district. Veatch, 1909; Butts and Gildersleeve, 1948.

Polk County

3. Eson Hill area. Veatch, 1909.

Meriwether County

4. Warm Springs district. Smith, 1929.

Quitman County

5. Balkcom property, Georgetown area. Smith, 1929; Veatch, 1909.
6. Lanier property, Hatcher Station area. Smith, 1929; Veatch, 1909.

Randolph County

7. Springvale area. Smith, 1929.
8. Moye property, Cuthbert area. Smith, 1929; Veatch, 1909.

Stewart County

9. Baldwin property, Troutman area. Smith, 1929; Veatch, 1909.

Schley County

10. Childers and Holloway properties, La Crosse and Ellaville areas. Smith, 1929; Veatch, 1909.

Sumter County

11. Kelley Mill, Andersonville area. Smith, 1929; Veatch, 1909.

Macon County

12. McMichael and English mines, Andersonville area. Smith, 1929.

Taylor County

13. Butler area. Ladd, 1898; Smith, 1929; Veatch, 1907, 1909.

Crawford County

14. Braswell property. Smith, 1929; Stull and Bole, 1926; Weigel, 1925.
15. Ogletree and Pearson properties, Zenith area. Smith, 1929; Veatch, 1909.

Houston County

16. Old Yancey mine, Perry area. Smith, 1929; Veatch, 1907, 1909.
17. Thompson estate, Kathleen area. Smith, 1929; Veatch, 1909.

Twiggs County

18. Dry Branch district. Smith, 1929; Thompson, 1943a; Veatch, 1907, 1908, and 1909.
19. Fitzpatrick area. Ladd, 1898; Smith, 1929; Munyan, 1938.

GEORGIA (cont'd.)

Wilkinson County

20. Gordon area. Smith, 1929; Stull, and Bole, 1926; Veatch, 1907, 1909; Warren and Thompson, 1943.
21. McIntyre and Clayfields areas. Smith, 1929; Veatch, 1907, 1909; Warren and Thompson, 1943.
22. Wriley area. Smith, 1929; Warren and Thompson, 1943.
23. Toombsboro area. Smith, 1929; Veatch, 1907, 1909; Warren and Thompson, 1943.

Baldwin County

24. Stevens Pottery area. Ladd, 1898, 1899; Smith, 1929; Stull and Bole, 1926; Veatch, 1907, 1909.

Washington County

General reference: Thompson, 1943b.

25. Oconee area. Smith, 1929; Veatch, 1909.
26. Sandersville area. Smith, 1929; Veatch, 1909.
27. Deepstep area. Smith, 1929; Munyan, 1938.

Hancock County

28. Carr's Station. Smith, 1929; Veatch, 1909.
29. Moate property, Devereux area. LeGrand and Furcron, 1956; Smith, 1929.

Glascok County

30. Gibson area. Smith, 1929; Veatch, 1907, 1909.

McDuffie County

31. Brinkley and Harrison properties, Dearing area. LeGrand and Furcron, 1956; Smith, 1929; Veatch, 1909.
32. Ansley property, Bonesville area. Smith, 1929; Veatch, 1909.

Richmond County

33. Fowler property, Belair area. Ladd, 1898; Smith, 1929; Veatch, 1909.
34. Hephzibah area. LeGrand and Furcron, 1956; Smith, 1929; Veatch, 1907, 1909.

IDAHO

[General references: Hodge, 1938; Hosterman and others, 1960; Hubbard, 1956; Wilson, Bennett, and Heath, 1923]

Idaho County

1. Camas Prairie. Hosterman and others, 1960; Sohn, 1952.

Lewis County

2. Nez Perce area. Hosterman and others, 1960; Skeels, 1920.

Latah County

3. Moscow area. Hosterman, 1960; Hosterman and others, 1960; Ponder and Keller, 1960; Sohn, 1952; Skinner and Kelly, 1949; Stephen, 1960.

IDAHO (cont'd.)

Benewah County

4. St. Maries. Skeels, 1920; Sohn, 1952.

Kootenai County

5. Harrison. Sohn, 1952.
6. Coeur d'Alene. Skeels, 1920; Sohn, 19 2.

ILLINOIS

[General reference: Jonas, 1957; Parmelee, 1922]

La Salle County

1. Ottawa. Lines, 1917; Parmelee and Schroyer, 1921; Purdy and DeWolf, 1907.
2. Utica. Lines, 1917; Parmelee and Schroyer, 1921; Purdy and DeWolf, 1907.

McDonough County

3. Colchester. Lines, 1917; Parmelee and Schroyer, 1921.

Greene County

4. Whitehall. Lines, 1917; Parmelee and Schroyer, 1921; Purdy and DeWolf, 1907.
5. Drake. Lines, 1917; Parmelee and Schroyer, 1921; Purdy and DeWolf, 1907.

Calhoun County

6. Howell Hollow area. Lamar, 1931.

Union County

7. Kaolin Station, Mountain Glen and Anna areas. Grim, 1934; Lamar, 1948; Parmelee and Schroyer, 1921; Piersol, Lamar, and Voskuil, 1933; Purdy and DeWolf, 1907; Ries, Bayley and others, 1922; St. Clair, 1917.

Pope County

8. Golconda clay deposit, Raum area. Lamar, 1942; Purdy and DeWolf, 1907.

Pulaski County

9. Grand Chain Landing area. Parmelee and Schroyer, 1921; Purdy and DeWolf, 1907.

Massac County

10. Round Knob area. Parmelee and Schroyer, 1921; Purdy and DeWolf, 1907.

INDIANA

[General references: Blatchley, 1897; Harrison, 1961; Indiana Geol. Survey, 1953; Logan, 1924; Whitlach, 1933a, b.]

Owen County

1. Hopewell property, Spencer area. Blatchley, 1896, 1905.

Greene County

2. Newark area. Blatchley, 1896, 1905; Logan, 1922.

INDIANA (cont'd.)

Lawrence County

3. Huron. Blatchley, 1896, 1905; Callaghan, 1948; Cox, 1875; Logan 1919, 1922; Ries, 1927; Ries, Bayley, and others, 1922.

Martin County

4. Dover Hill. Blatchley, 1896, 1905; Logan, 1922.
5. Shoals area. Blatchley, 1896, 1905; Logan, 1922.

KANSAS

[General references: Kinney and Plummer, 1942; McMillan and Wilson, 1948; Plummer and Romary, 1947; Plummer and others, 1954]

Washington County

1. North-central area. Plummer and Romary, 1942.

Cloud County

2. Southern Cloud County. Plummer and Romary, 1942.

Ottawa County

3. Northern Ottawa County. Plummer and Romary, 1942.

KENTUCKY

[General references: Burroughs, 1930; Crider, 1906a; Easton, 1913; Floyd and Kendall, 1955; Gardner, Fohs and Foerste, 1905; Jillson, 1926a, b; McGrain, and others, 1960; McGrain and Floyd, 1956]

Boyd County

1. Ashland district. Crider, 1913; Phalen, 1906, 1908; Ries, 1922a, b.

Carter County

2. Grahn area. Crider, 1913; Ries, 1922b.
3. Olive Hill district. Crider, 1913; Greaves-Walker, 1906, 1907; Hosterman and Patterson, 1961; Jillson, 1926b; Ries, 1922a, b; Patterson and Hosterman, 1960, 1963.
4. Hayward area. Crider, 1913; Ries, 1922a, b.

Rowan County

5. Elliottville area. McGrain and Kendall, 1957; Patterson and Hosterman, 1960, 1963.

Hart County

6. Bonnieville area. Crider, 1913; Gardner, 1905b; McGrain, 1960; Ries, 1922b.

Edmonson County

7. Stice place, Brownsville area. Crider, 1913; Gardner, 1905b; Ries, 1922b.

Calloway County

8. Jackson Purchase region, Murray area. Gardner, 1905a; Loughridge, 1888; Ries, 1922b, Roberts, 1930.

KENTUCKY (cont'd.)

Graves County

9. Hickory area. Gildersleeve, 1900; Ries, 1922b; Ries, Bayley, and others, 1922.
10. Pryorsburg area. Gildersleeve, 1950; McFarlan, 1943; Ries, 1922b; Ries, Bayley, and others, 1922.

MARYLAND

[General references: Mathews, 1922; Ries, 1902.]

Cecil County

1. Maryland Clay Company mines, Northeast station. Mathews, 1902; Ries, 1902.

Allegany County

2. Mount Savage area. Clark and others, 1900; Levy, 1955; Martin, 1902; Ries, 1902, 1903; Waag , 1950; Watts, and others, 1922.

Garrett County

3. Castleman River, Tarkiln Run area. Martin, 1902; Ries, 1902; Waag , 1950; Watts, and others,
4. Swallow Falls area. Martin, 1902; Ries, 1902, 1903; Watts and others, 1922.
5. Blaine area. Martin, 1902; Ries, 1902, 1903.

MASSACHUSETTS

Dukes County

1. Gayhead. Ries, 1903, 1927; Shaler, 1888.

Hampden County

2. Blandford. Crosby, 1890; Emerson, 1895; Ries, 1903, 1927; Shaler, 1888.

Berkshire County

3. Clayton. Ries, 1897b, 1903, 1927.

MINNESOTA

[General references: Berkey, 1902; Emmons and Grout, 1943; Grout, 1916; Grout and Soper, 1914]

Morrison County

1. Little Two River area. Grout and Soper, 1914.

Stearns County

2. Richmond. Grout and Soper, 1914; Winchell, 1874.

Renville County

3. Birch Cooley, Morton area. Hall, and others, 1911; Winchell, 1874.

Redwood County

4. Redwood Falls area. Grout and Soper, 1914; Winchell, 1874.

Brown County

5. New Ulm. Grout and Soper, 1914; Winchell, 1874.

MISSISSIPPI

[General references: Crider, 1906b, Logan and Hand, 1905; Mellen, 1959.]

Marshall County

1. Holly Spring area. Logan, 1907, 1909; Vestal, 1954.

Tippah County

2. Falkner area. Conant and McCutchen, 1941.
3. Barber and Pearce properties, Ripley area. Conant and McCutchen, 1941.
4. Mark Hill region, Blue Mountain area. Conant and McCutchen, 1941.

Benton County

5. Flat Rock Church area. Conant and McCutchen, 1942; Lusk, 1956; Reed, 1952.
6. Fowler area, Conant and McCutcheon, 1942; Lusk, 196; Reed, 1952.

Union County

7. Pinedale region. Conant and McCutcheon, 1942; Reed, 1952.

Pontotoc County

8. Thaxton area. Priddy and McCutcheon, 1943b; Reed, 1952.
9. Toccopola area. Priddy and McCutcheon, 1943b; Reed, 1952.
10. Randolph area. Priddy and McCutcheon, 1943b; Reed, 1952.

Montgomery County

11. Huntsville area. Priddy and McCutcheon, 1943a.

Winston County

12. Betheden area. Mellen and McCutcheon, 1939; Reed, 1952.
13. Sullivamn area. Mellen and McCutcheon, 1939; Reed, 1952.

Tishomingo County

14. Iuka area. Crider, 1906b; Logan, 1909; Mellen, 1937.

Itawamba County

15. Cooper Place. Logan, 1909; Vestal and Knollman; 1947.
16. Whitney. Logan, 1909; Vestal and Knollman, 1947.
17. Kennedy and Summerford Potteries, Whitney area. Logan, 1909; Vestal and Knollman, 1947.

MISSOURI

[General references: Keller, 1944; McQueen, 1929b; McQueen and Forbes, 1928; Missouri Geol. Survey and Water Res., 1944; Tarr and Keller, 1936.]

MISSOURI (cont'd.)

Ralls County

1. Perry area. McQueen, 1929a; McQueen and Herold, 1943.

Northern District

Audrain County

2. Vandalia. Allen, 1937; Ries, 1897b; Thornberry, 1925.
3. Farber. Allen, 1937; Ries, 1897b; Thornberry, 1925.
4. Mexico. Allen, 1937; Ries, 1897b; Thornberry, 1925.

Boone County

5. Turner Farm, Columbia area. McQueen and Herold, 1943; Unklesbay, 1955.

Callaway County

6. Fulton area. Allen, 1937; McQueen and Herold, 1943; Ries, 1896; Unklesbay, 1955.

Montgomery County

7. Phipps mine, Wellsville area. Allen, 1937; McQueen and Herold, 1943; Thornberry, 1925.
8. Montgomery City. McQueen and Herold, 1943; Thornberry, 1925.
9. New Florence. McQueen and Herold, 1943; Thornberry, 1925.
10. High Hill area. McQueen and Herold, 1943; Wheeler, 1896.

Warren County

11. Pendleton area. McQueen and Herold, 1943; Wheeler, 1896.
12. Truesdale area. McQueen and Herold, 1943; Wheeler, 1896.

Southern District

Morgan County

13. Versailles area. Mather, 1946; Thornberry, 1925; Wheeler, 1896.

Osage County

14. Linn area. McQueen and Herold, 1943; Wheeler, 1896.

Gasconade County

15. Swiss area. McQueen and Herold, 1943; Thornberry, 1925.
16. Drake area. McQueen and Herold, 1943; Wheeler, 1896.
17. Rosebud area, Owensville. McQueen and Herold, 1943; Thornberry, 1925; Wheeler, 1896.
18. Owensville area. McQueen and Herold, 1943; Thornberry, 1925; Wheeler, 1896.
19. Canaan. McQueen and Herold, 1943; Thornberry, 1925; Wheeler, 1896.

MISSOURI (cont'd.)

Maries County

20. Belle area. McQueen and Herold, 1943; Thornberry, 1925.

Phelps County

21. Rolla area. Allen, 1935; McQueen and Herold, 1943.
22. St. James area. McQueen and Herold, 1943; Thornberry, 1925; Wheeler, 1896.

Southern District

Crawford County

23. Cuba. McQueen and Herold, 1943.
24. Leasburg. Ries, 1896; Thornberry, 1925; Wheeler, 1896.

Franklin County

25. Sullivan area. Thornberry, 1925; Wheeler, 1896.
26. Elmont area. McQueen and Herold, 1943; Wheeler, 1896.
27. Anaconda area. McQueen and Herold, 1943; Wheeler, 1896.
28. Leslie area. McQueen and Herold, 1943; Thornberry, 1925.
29. Union area. McQueen and Herold, 1943; Wheeler, 1896.
30. Pacific. McQueen and Herold, 1943; Thornberry, 1925.

St. Louis County

31. Cheltenham district. Allen, 1937; Fenneman, 1907, 1911; Ladd, 1890.

Jefferson County

32. Regina. Thornberry, 1925; Wheeler, 1896.

Lawrence County

33. Summers prospect, Aurora area. Allen, 1935; Smith and others, 1935; Wheeler, 1896; Zvanut, 1937.

Bollinger County

34. Glen Allen district. Orton, 1907; Wheeler, 1896.

Stoddard County

35. Ardeola. Davis and others, 1941.
36. Bloomfield area. Davis and others, 1941.
37. Dexter area. Davis and others, 1941; Wheeler, 1896.

MONTANA

Cascade County

1. Armington. Fisher, 1908; Knechtel and others, 1948; Ries, 1927.

Fergus County

2. Lewiston. Dougan, 1947; Kerr and Kulp, 1949; Roby and Robertson, 1949.

NEVADA

Churchill County

1. Lovelock. Ries, Bayley, and others, 1922.

Lincoln County

2. Boyd. Hodge, 1938; Moore, 1936.

NEW JERSEY

[General reference: Ries and others, 1904]

Middlesex County

1. South Amboy area. Cook, 1878; Ries and others, 1904.
2. Sayreville (Burt Creek area), Sand Hills-Florida Grove area. Ries and others, 1904.
3. Woodbridge district. Cook, 1878; Ries and others, 1904.

NEW MEXICO

[General references: Glassmire, 1957, Northrop, 1944.]

Dona Ana County

1. Organ area. Richard, 1933; Talmage and Wootton, 1937.

Rio Arriba County

2. Mesa Alta. Kerr and Kulp, 1949.

NEW YORK

Richmond County

1. Kreisherville area. Ries, 1895, 1900a, 1903, 1927.

Nassau County

2. Glen Cove area. Ries, 1895, 1900a.

Suffolk County

3. Northport area. Ries, 1895, 1900a.

Cortland County

4. Hall property, Homer area. Ries, 1895, 1900a.

NORTH CAROLINA

[General references: Bryson, 1937; Greaves-Walker and Riggs, 1937; Holmes, 1896; Ries, 1897a; Stuckey, 1947].

Macon County

1. McGuire prospect, Franklin area. Bayley, 1925; Ries, Bayley, and others, 1922; Watts, 1913, 1914.
2. Cunningham prospect, Franklin area. Bayley, 192; Ries, Bayley, and others, 1922.
3. Ferguson prospect, Franklin area. Bayley, 1925; Ries, Bayley, and others, 1922.
4. West prospect, West Mills area. Bayley, 1925; Ries, 1897a; Watts, 1913, 1914.

Jackson County

5. Hog Rock mine, Dillsboro area. Bayley, 1925; Ries, 1897a; Ries, Bayley and others, 1922; Watts, 1913, 1914.

Haywood County

6. Herren prospect, Waynesville area. Bayley, 1925; Ries, Bayley, and others, 1922.
7. Hand Clay mine, Woodrow area. Bayley, 1925; Ries, Bayley, and others, 1922.

Spruce Pine District (General references: Hunter, 1940; Hunter and Hash, 1953; Hunter and Mattocks, 1936; Stuckey, 1947).

Yancey County -- Spruce Pine District

8. Newdale-Lunday. Parker, 1946.

Mitchell County -- Spruce Pine District

9. Spruce Pine. Parker, 1946; Tennessee Valley Authority and U. S. Bur. Mines, 1941; Watts, 1913, 1914.

Avery County--Spruce Pine District

10. Bushy Creek. Parker, 1946.

Cleveland County

11. Green Mica mine, Shelby area. Bayley, 1925; Watts, 1913, 1914.
12. Tom Baxter mica mine, Shelby area. Bayley, 1925; Watts, 1913, 1914.

Lincoln County

13. Piedmont tin mine, Lincoln area. Bayley, 1925; Ries, Bayley, and others, 1922; Watts, 1913, 1914.

Richmond County

14. Steele Exploration property, Ellerbe area. Bayley, 1925; Broadhurst, 1950; Ries, 1897a; Ries, Bayley and others, 1922.

Montgomery County

15. Overton deposit, Candor area. Bayley, 1925; Ries, Bayley and others, 1922.

NORTH DAKOTA

[General references: Budge, C. E., 1954; Budge, W. E., 1930; Clarke, 1948; Hansen and others, 1959; Leonard, 1906; Leonard and others 1906].

Stark County

1. Dickinson area. Clapp, 1907; Manz, 1953; Ries, 1927; Shride and others, 1947.

Morton County

2. Hebron. Clapp, 1907; Manz, 1953; Ries, 1927.
3. Mandan area. Manz, 1953; Ries, 1927.

OHIO

[General references: Stout, 1930, 1946].

Scioto County

1. Scioto district. Stout, 1916, 1923; Stout and others, 1923.

Vinton County

2. Lincoln Furnace Field. Bole and others, 1951; Stout, 1927, 1940.
3. Hope Furnace. Bole and others, 1951; Stout, 1927, 1932, 1940.

Hocking County

4. Logan area. Stout, 1923; Stout and others, 1923.

Perry County

5. Maxville area. Flint, 1951; Stout, 1923; Stout and others, 1923.
6. Moxahala area. Flint, 1951; Stout, 1923.

OKLAHOMA

[General references: Gould and others, 1908; Sheerar and Redfield, 1932; Snider, 1911b.]

Kiowa County

1. Roosevelt - Cooperton areas. Chase and Burwell, 1952; Snider, 1911a, b.
2. Cold Spring area. Chase and Burwell, 1952; Knox, 1948.

Comanche County

3. Meers area. Chase and Burwell, 1952; Knox, 1948.

OREGON

[General references: Geijsbeck, 1913; Hodge, 1938.]

Clackamas County

1. Carver. Hodge, 1938; Sohn, 1952.
2. Mollalla area. Nichols, 1944; Skinner and Kelly, 1949; Sohn, 1952; Wilson and Treasher, 1938; Wimpler and others, 1944.

Yamhill and Polk Counties

3. Willamina area. Hodge, 1938; Sohn, 1952; Wilson and Treasher, 1938.

Marion County

4. Mehama area. Hodge, 1938; Sohn, 1952; Wilson and Treasher, 1938.

Morrow County

5. Heppner. Sohn, 1952.

Benton County

6. Bellefountain. Chelikowsky, 1935; Hodge, 1938; Sohn, 1952; Wilson and Treasher, 1938.

Lane County

7. Mable. Chelikowsky, 1935; Hodge, 1938; Sohn, 1952; Wilson and Treasher, 1938.
8. Spencer Butte. Sohn, 1952.
9. Winberry. Hodge, 1938; Sohn, 1952; Wilson and Treasher, 1938.

OREGON (cont'd.)

10. Putnam. Sohn, 1952.

Lane and Douglas Counties

11. Hobart Butte area. Allen, Loofbourow, and Nichols, 1951; Loofbourow, 1943; Iverson and Coughlin, 1945; Skinner and Kelly, 1949; Sohn, 1952; Wilson and Treasher, 1938; Wimmeler and others, 1944.

PENNSYLVANIA

[General references: Ashley and Glenn, 1906; Ashley, and others, 1908; Harvey, 1935; Hice, 1916; Leighton, 1930, 1934; Moore, 1922; Morganroth, 1916; Sanford, 1949; Stose, 1907; Woolsey, 1904].

Beaver County

1. Beaver River Valley district, Brighton area. Hopkins, 1898; Leighton and Shaw, 1932; Ries, 1903; Woolsey, 1906.

Clarion County

2. Niles Fire Brick Company mine, Shippenville area. Lines, 1907; Leighton 1941.

Clarion and Armstrong Counties

3. Climax area. Butts, 1906; Leighton, 1941; Leighton and Shaw, 1932; Shaw, 1928.

Indiana County

4. Blacklick Creek district, Hopkins, 1898; Shaffner, 1958; Shaw, 1928.

Westmoreland County

5. Salina area. Hopkins, 1898; Leighton and Shaw, 1932; Stone, 1905.
6. Bolivar district. Hopkins, 1898; Leighton and Shaw, 1932; Shaffner, 1958; Shaw, 1928; Stone, 1905.
7. Hunkers area. Leighton and Shaw, 1932.

Somerset County

8. Williams area. Leighton, 1941; Lesley and Harden, 1886.

Cambria County

9. South Fork area. Leighton, 1941; Phalen and Martin, 1907; Shaw, 1928.
10. Dean area. Leighton, 1941.
11. Blandburg area. Leighton, 1941.

Centre County

12. Sandy Ridge and Penelton area. Leighton, 1941; Shaw, 1928.

Clearfield County

13. Blue Ball (West Decatur-Morgan Run) area. Bolger and Weitz, 1951; Foose, 1944; Leighton, 1941; Platt, 1875; Ries, 1903; Shaw, 1928; Weitz and Bolger, 1951.
14. Woodland area. Leighton and Shaw, 1932; Platt, 1875; Ries, 1903.

PENNSYLVANIA (cont'd.)

15. Curwensville area. Ashley, 1940; Bolger and Weitz, 1951; Foose, 1944; Leighton, 1941; Shaw, 1928.

Elk County

16. Benezett area. Platt, 1875; Ries, 1903.

Clinton County

17. Monument-Oriston district. Bolger and Weitz, 1951; Leighton, 1941; Shaw, 1928.
18. Renovo-Farrandsville district. Bolger and Weitz, 1951; Leighton, 1941.
19. Queens Run area. Foose, 1946; Leighton, 1941.

Delaware County

20. Brandywine Summit area. Ashburner, 1886; Hopkins, 1899a; Lesley, 1886; Ries, 1903.

Chester County

21. Kaolin, South Valley Hills area. Hopkins, 1899a, b; Leighton, 1941; Lesley, 1886; Ries, 1903.

SOUTH CAROLINA

[General references: Neuman, 1927; Sloan, 1908].

Aiken County

1. Langley district. Lang, 1940; Ries, Bayley and others, 1922; Sloan, 1904; Weigel, 1922.
2. Sterling Kaolin mine, Warrenville area. Sloan, 1904.
3. Aiken area. Sloan, 1904; Smith, 1949.
4. Trenholm Estate, Seivern area. Ries, Bayley and others, 1922; Sloan, 1904.

Lexington County

5. Geiger property, Gaston area. Ries, Bayley and others, 1922; Sloan, 1904.

Richland County

6. Daniels Pit, Horrell Hill. Lang, 1940; Ries, Bayley and others, 1922.
7. Killian Pit, Columbia area. Lang, 1940; Sloan, 1904.

SOUTH DAKOTA

[General reference: Rothrock, 1944].

Pennington Conty

1. Powder House Gulch. Bryson and others, 1947; Chelikowsky, 1935; Todd, 1902.

TENNESSEE

[General reference: Crider, 1906a]

Henry County

1. Etheridge Pit, Whitlock area. Kirkpatrick and Nelson, 1912; Nelson, 1911; Schroeder, and Parmelee, 1919; Whitlatch, 1940.

TENNESSEE (cont'd.)

2. India area. Kirkpatrick and Nelson, 1912; Nelson, 1911; Whitlatch, 1940.
3. Henry area. Nelson, 1911; Schroeder and Parmelee, 1919; Whitlatch, 1940.

Weakley County

4. Gleason area. Spain, 1936; Whitlatch, 1940.

Carroll County

5. McKenzie area. Whitlatch, 1940
6. Huntingdon area. Bramlette, 1940; Whitlatch, 1940.
7. Clarksburg area. Whitlatch, 1940; Whitlatch and Gildersleeve, 1946.

Hardeman County

8. Patrick prospect, Bolivar area. Bramlette, 1940; Whitlatch, 1940.
9. Prospects, Bolivar area. Bramlette 1940; Nelson, 1911; Whitlatch, 1940.

TEXAS

[General references: Pence and others, 1948; Phillips, 1914; Schoch and McKnight, 1938].

Jeff Davis County

1. Medley district. McMillan and others, 1949; Pence, 1949; Ries, 1927; Sellards and Baker, 1934; Vogel, 1942.

Real County

2. Leaky. Lawton, 1929; Nobles, 1946; Potter and McKnight, 1931; Ries, 1908, 1927.

Uvalde County

3. Uvalde. Potter and McKnight, 1931.

McMullen County

4. Kuykendall Ranch, Fowlerton area. King, 1940.
5. Franklin Ranch, Fowlerton area. King, 1940.

Wilson County

6. Hayden and Stockdale area. Cowan, 1942.

Fayette County

7. Leitenberg property, Lena area. Deussen, 1911.

Cherokee County

8. Troup district. Nobles, 1946; Pence, 1950; Stenzel, 1950a, b.

UTAH

[General reference: Hampel and Cutler, 1953].

Washington County

1. St. George. Kerr and Kulp, 1949.

Juab County

2. Dragon Iron mine, Eureka. Hyatt, 1956; Kerr and Kulp, 1949.

UTAH (cont'd.)

Utah County

3. Cedar Valley. Greaves-Walker 1911.
4. Lehi area. Greaves-Walker, 1911, 1939; Hyatt, 1956

VERMONT

[General reference: Perkins, 1912].

Bennington County

1. Bennington. Burt, 1929; Hitchcock and others, 1861; Jacobs, 1927.

Rutland County

2. Wallingford, Hitchcock and others, 1861; Jacobs, 1927.
3. Brandon deposits, Forestdale area. Dana, 1884; Hitchcock and others, 1861; Jacobs, 1927; Perkins, 1904; Ries, 1903; Woodworth, 1904.

Addison County

4. Monkton area. Dana, 1884; Hitchcock and others, 1861; Jacobs, 1927.

VIRGINIA

Henry County

1. Garrett property, Ridgeway area. McGill, 1936; Pegau, 1932; Stow, 1951.
2. Oak Level. Ries, 1906a, 1907, 1927; Ries and Somers, 1917.

Pittsylvania County

3. Bromfield prospects, Alta Vista area. Pegau, 1932.
4. Motley area. Pegau, 1932; Ries and Somers, 1917.
5. Jackson property, Alta Vista area. Pegau, 1932; Ries and Somers, 1917.

Botetourt County

6. Lynchburg (Grubb) mine, Blue Ridge Springs area. Ries and Somers, 1920.

Bedford County

7. Everett prospect, Forest area. McGill, 1936; Pegau, 1932; Stow, 1951.

Nelson County

8. Roseland. Ries, 1907; Ries, Bayley and others, 1922; Ries and Somers, 1917.

Augusta County

9. Lofton. Ries, Bayley, and others, 1922; Ries and Somers, 1920.
10. Cold Spring. Ries, Bayley and others, 1922; Ries and Somers, 1920.
11. Sherando area. Ries, 1903, 1907.

VIRGINIA (cont'd.)

Chesterfield County

12. Bon Air. Ries, 1903, 1907.

WASHINGTON

[General references: Geijbeck, 1911; Glover, 1923; Hodge, 1938; Landes, 1905; Valentine, 1949; Wilson, Bennett, and Heath, 1923]

Spokane County

1. Spokane area. Glover, 1941; Hosterman and others, 1960; Shedd, 1910; Sohn, 1952; Wilson, 1923; Wilson and Goodspeed, 1934.
2. Five Mile Prairie. Glover, 1941; Hosterman and others, 1960; Skinner and Kelly, 1949; Sohn, 1952.
3. Medical Lake. Glover, 1941; Hodge, 1938; Sohn, 1952.

Spokane and Stevens Counties

4. Clayton area. Glover, 1941; Shedd, 1910; Sohn, 1952; Wilson, 1923.

Stevens County

5. Valley. Glover, 1941; Shedd, 1910; Sohn, 1952; Weaver, 1920; Wilson, 1923.

Pend Oreille County

6. Pend Oreille. Hodge, 1938; Sohn, 1952.

Chelan County

7. Wenatchee area. Glover, 1941; Huntting, 1943; Sohn, 1952.

Whatcom County

8. Sumas. Glover, 1941; Shedd, 1910; Wilson, 1923; Sohn, 1952.

King County

9. Kummer area. Glover, 1941; Nichols, 1945; Shedd, 1910; Sohn, 1952; Warren and others, 1945; Wilson, 1923; Wilson and Goodspeed, 1934.

Pierce County

10. La Grande-Clay City area. Glover, 1941; Wilson, 1923; Shedd, 1910; Sohn, 1952.

Cowlitz and Lewis Counties

11. Cowlitz area. Allen and Nichols, 1943; Glover, 1941; Nichols, 1943; Popoff, 1955; Roberts, 1958; Shedd, 1910; Skinner and Kelly, 1949; Sohn, 1952; Wilson, 1923; Wimpler and others, 1944.

Clark County

12. Fly Creek. Sohn, 1952.

WEST VIRGINIA

[General reference Galpin, 1935]

Mineral County

WEST VIRGINIA (cont'd.)

1. Piedmont Brick and Coal Company mine, Piedmont. Grimsley, 1906; McCue and others, 1948; Ries, 1903.

Taylor County

2. Thorton Fire Brick Company mines, Thorton. Grimsley, 1906; McCue and others, 1948; Ries, 1903.

Marion County

3. Hammond Fire Brick Company mines, Hammond. Grimsley, 1906; Hennen and Reger, 1913; McCue and others, 1948; Ries, 1903.

Monongalia and Preston Counties

4. Knowlton and Ford prospect, Cascade area. Hennen and Reger, 1913, 1914; McCue and others, 1948.

Hancock County

5. New Cumberland area. Grimsley, 1906, 1907; Tallon and Hunter, 1959.

WISCONSIN

Barron County

1. Mallo property, Rice Lake. Buckley, 1901; Ries, 1906b.

St. Croix County

2. Glenwood area. Buckley, 1901; Ries, 1903, 1906b.
3. Hersey. Buckley, 1901; Ries, 1903, 1906b.

Eau Claire County

4. Eau Claire area. Buckley, 1901; Ries, 1903, 1906b.

Wood County

5. Grand Rapids. Buckley, 1901; Irving, 1876; 1877, 1880; Ries, 1906b.

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