TO ACCOMPANY MAP MR-33

GYPSUM AND ANHYDRITE IN THE UNITED STATES

(Exclusive of Alaska and Hawaii)

by

C. F. Withington

Introduction

The distribution of gypsum and anhydrite in the United States (exclusive of Alaska and Hawaii) is shown on the accompanying map. In addition to mines, open pits, and occurrences, the map shows the outcrop patterns of gypsum-bearing fomations and other outlines of the important evaporite basins in which gypsum and anhydrite might be found. Because of the numerous factors involved in determining the amount and purity of the calcium sulfate present in each deposit, no attempt was made to rank the deposits according to size. Deposits of gypsum and anhydrite have not been differentiated on the map.

The mines, open pits, and other localities are numbered on the map and keyed to the Locality Index. The index, arranged by States, gives the name of the nearest town or geographic feature, the geologic setting, and the geographic coordinates of the deposits.

Both published and unpublished data were used in this compilation, and the principal references are cited in the index.

Geology

Gypsum and anhydrite in the United States have been found in every geologic system except the Cambrian. The resources of both minerals are very large, though many of the deposits are too far from consuming centers to be worked profitably at the present time. Gypsum is the more important of the two minerals.

Gypsum is a hydrous calcium sulfate ($CaSO_4 \cdot 2H_2O$). When pure it contains 32.5 percent lime (CaO), 46.6 percent sulfur trioxide (SO_3), and 20.9 percent water. Several varieties are found in nature. Rock gypsum and alabaster are massive compact varieties, gypsite and gypsum sands are unconsolidated varieties, satin spar is the fibrous variety, and selenite is the clear crystalline variety.

Rock gypsum, the most common form, is an aggregate of crystals that range from less than 0.1 millimeter to more than 2.0 millimeters in diameter. The rock is generally white, but impurities may color the gypsum pink, black, green, or yellow. It occurs within sedimentary rocks as beds or broad lenses that may range from a few inches to as much as 30 feet in thickness. Commercial deposits commonly range from 85 to 98 percent gypsum, and average about 90 percent. Impurities include stringers and lenses of limestone, shale, and sandstone.

Alabaster is compact, very fine grained crystalline gypsum. It is generally white, though pink and gray varieties are common. The compact but soft nature of alabaster makes it easy to carve into vases and other ornaments.

Gypsite consists of isolated crystals of gypsum scattered through alluvium or playa lake sediments. Gypsum sands are made up of crystals that have been transported by wind and deposited in dunes of remarkable purity. An outstanding example of a deposit of this type is the White Sands near Alamogordo, N. Mex. The more important gypsite and gypsum sand deposits are shown on the map.

Selenite occurs either scattered through rock gypsum or in a clay matrix; individual crystals are generally less than 2 inches long, though some are as much as 4 feet long.

Satin spar, formed by precipitation of calcium sulfate from solutions derived from nearby gypsum beds, consists of white needle-like crystals that occur in narrow veinlets, usually in mudstone and shale. The crystals are compact and perpendicular to the walls of the vein. The occurrences of selenite and satin spar are not indicated on the map; they are of mineralogical interest only.

Anhydrite (calcium sulfate) occurs in fine- to coarse-grained masses that make up an entire bed, or as isolated crystals, lenses, or beds within a gypsum deposit. It is closely associated with gypsum but is slightly heavier, harder, and lacks water of crystallization. When pure it contains 41.19 percent CaO and 58.81 percent SO_3.

Most deposits of massive gypsum and anhydrite were formed by evaporation of sea water in basins that had one or more restricted openings to the sea. The basins range in diameter from a few miles to many hundreds of miles.

The environment of deposits ranges from lagoonal, in which a barrier to the sea is formed by limestone reefs, to nearshore, where the deposits represent an invasion of the sea into an area of continental sedimentation.

Most writers agree that calcium sulfate was deposited originally as anhydrite that was later altered to gypsum by hydration. Gypsification takes place when ground and surface waters come in contact with anhydrite. The depth to which anhydrite is hydrated to form gypsum is generally related to topography, structure, and climate, for these factors affect the degree of ground and surface water penetration. The depth of hydration is important in mining, as the presence of only a few percent anhydrite is sufficient to render gypsum unusable for making plaster.

Uses

In 1960 nearly 10 million short tons of gypsum was mined

in this country and about 5.3 million short tons was imported. Of this total amount more than 8 million tons was calcined. Calcined gypsum is used for plaster and prefabricated plaster products such as wallboard, lath and sheathing, pottery molds, and orthopedic and dental plasters.

Raw gypsum is most commonly used as a set-retarder for portland cement, and to a lesser extent as a soil conditioner. Gypsum promotes the growth of peanuts and legumes by providing the necessary sulfur, and it can be used to reclaim alkali soils that contain sodium carbonate. The gypsum reacts with the sodium carbonate to form calcium carbonate and sodium sulfate. Raw gypsum is also used in the manufacture of ammonium sulfate fertilizers. In this process the acid radical of the gypsum ($SO_4=$) is combined with synthetic ammonia derived from nitrogen in the atmosphere. Other uses of raw gypsum include: fillers in paint and paper; nutrient in the growing of yeasts; rockdust in coal mines; and carriers for insecticides.

Alabaster is used in statuary and other ornaments. Anhydrite, crushed or ground, is used as a soil conditioner and to some extent as a retarder in portland cement. It can be roasted with coke, sand, and aluminum-bearing shales to make sulfuric acid and cement clinker, and it can be used in the manufacture of sulfur, but these uses are not yet economical in the United States.

LOCALITY INDEX

(Numbers refer to map)

County, location, geologic age, and reference	Lat. N.	Long. W.
ARIZONA		
Yuma County		
Undifferentiated gypsum-bearing rocks of Permian age		
1. Bouse Galbraith and Brennan, 1959	33°58′	114°01′
Maricopa County		
Undifferentiated gypsum-bearing rocks of Tertiary age		
2. Black Gap Phalen, 1914	32°45′	112°45′
Pima County		
Undifferentiated gypsum bearing rocks of Permian age		
3. San Xavier	32°07′	111°06′
4. Mineral Hill	31°59′	111°05′
5. Empire Mountains, west	31°56′	110°38′
6. Empire Mountains, middle	31°55′	110°37′
7. Empire Mountains, east	31°54′	110°36′
8. Santa Rita Mountains	31°54′	110°47′
9. Alamo Springs	32°19′	110°46′
Gypsite, Quaternary age		
10. Vail Galbraith and Brennan, 1959	32°03′	110°45′
Cochise County		
Gypsite, Quaternary age		
11. Douglas	31°27′	109°27′
Undifferentiated gypsum-bearing rocks of Tertiary age		
12. Turkey Ridge Creek Coates and Cushman, 1955	31°48′	109°35′
13. Land Stone and others, 1920	31°50′	110°15′
Pinal County		
Undifferentiated gypsum-bearing rocks of Tertiary age		
14. Reddington	32°32′	110°27′
15. Feldman, east side San Pedro River	32°53′	110°39′
16. Feldman, east side San Pedro River	32°54′	110°40′
17. Feldman, west side San Pedro River Stone and others, 1920	32°53′	110°45′
Gila County		
Undifferentiated gypsum-bearing rocks of Tertiary age		
18. San Carlos Bromfield and Shride, 1956	33°19′	110°28′
Yavapai County		
Undifferentiated gypsum-bearing rocks of Tertiary age		
19. Camp Verde Galbraith and Brennan, 1959	34°27′	111°52′
Navaho County		
Moenkopi formation, Triassic age		
20. Snowflake	34°29′	110°08′
21. Woodruff	34°45′	110°01′
22. Winslow Stone and others, 1920	35°04′	110°44′
Coconino County		
Moenkopi formation, Triassic age		
23. Black Falls Anthony and others, 1955	35°33′	111°15′
Mohave County		
Moenkopi formation, Triassic age		
24. Rock Canyon	36°58′	113°33′
Kaibab limestone, Permian age		
25. Antelope Wash	36°42′	112°52′
26. Hurricane Cliff	36°53′	113°22′
Moenkopi formation, Triassic age		
27. Black Rock Spring	36°48′	113°34′

Kaibab limestone, Permian age

28. Wolf Hole	36°45′	113°34′
29. Toroweap Canyon	36°27′	113°05′
30. Hack Canyon McKee, 1938	36°34′	112°48′

Muddy Creek formation, Tertiary age

31. Detrital Wash Longwell, 1928	36°01′	114°28′

Subsurface only:

Supai formation, Pennsylvanian and Permian age

Supai basin.

Lang, 1957

Paradox member, Hermosa formation, Pennsylvanian age

Paradox basin

Lang, 1957

ARKANSAS

Pike County

DeQueen limestone, Cretaceous age

1. Highland	34°02′	93°46′
2. Plaster Bluff Miser, 1920	34°02′	93°42′

Subsurface only:

Ferry Lake anhydrite, Cretaceous age

Ferry Lake basin
Imlay, 1940

CALIFORNIA

San Joaquin County

Selenite veins

1. Vernalis Ver Planck, 1952	37°41′	121°19′

Merced County

Gypsite, Quaternary age

2. Los Banos Creek	37°01′	120°52′
3. Ortigalita Creek Ver Planck, 1952	36°57′	120°44′

Fresno County

Gypsite, Quaternary age

4. Little Panoche Valley	36°44′	120°52′
5. Panoche Hills	36°42′	120°42′
6. Tumey Gulch	36°34′	120°36′
7. Monocline Ridge	36°24′	120°28′
8. Oilfields	36°17′	120°21′
9. Coalinga	36°10′	120°25′
Ver Planck, 1952		

San Benito County

Undifferentiated gypsum-bearing rocks, Tertiary age

10. Silver Creek	36°28′	120°37′
11. Hernandez	36°21′	120°49′
12. South of Bitterwater	36°20′	120°55′
13. West of Bitterwater Ver Planck, 1952	36°21′	120°59′

Kings County

Gypsite, Quaternary age

14. Kettleman Hills	36°03′	120°06′
15. Avenal Gap Ver Planck, 1952	35°49′	119°59′

Kern County

Gypsite, Quaternary age

16. McClure Valley	35°43′	119°54′
17. Lost Hills	35°38′	119°42′
18. Packwood Canyon	35°34′	120°05′
19. Blackwells Corner	35°30′	119°57′
20. McKitterick	35°20′	119°43′
21. Cottonwood Creek	35°22′	118°45′
22. Koehn Lake	35°17′	117°53′
23. Kern Lake	35°07′	119°04′
24. Buena Vista Lake	35°10′	119°21′
25. Pioneer	35°01′	119°22′

Undifferentiated gypsum-bearing rocks, Tertiary age

26. Cuddy Canyon Ver Planck, 1952	34°41′	119°07′

San Luis Obispo County

Gypsite, Quaternary age

27. Shandon	35°37′	120°19′
28. Simmler	35°21′	119°58′
29. Carriso Plain	35°13′	119°48′

Undifferentiated gypsum-bearing rocks of Tertiary age

30. Alamo Creek	35°04′	120°15′
31. Arroyo Grande Creek Ver Planck, 1952	35°09′	120°33′

Santa Barbara County

Undifferentiated gypsum-bearing rocks of Tertiary age

32. Cuyama Valley Ver Planck, 1952	34°49′	119°28′

Ventura County

Undifferentiated gypsum-bearing rocks of Tertiary age

33. Quatal Canyon	34°49′	119°23′
34. Cuyama River-Burges Canyon	34°44′	119°24′
35. Nordhoff	34°27′	119°11′

Gypsite, Quaternary age

36. Oak Ridge Ver Planck, 1952	34°20	118°54′

Los Angeles County

Undifferentiated gypsum-bearing rocks of Tertiary age

37. Charlie Canyon	34°33′	118°32′
38. Mint Canyon	34°30′	118°24′
39. Palmdale Ver Planck, 1952	34°34′	118°06′

Orange County

Undifferentiated gypsum-bearing rocks of Tertiary age

40. Sycamore Canyon	33°52′	117°43′
41. Gypsum Canyon Ver Planck, 1952	33°47′	117°38′

Riverside County

Gypsite, Quaternary age

42. Corona district	33°52′	117°37′

Undifferentiated gypsum-bearing rocks of Permian age

43. Midland	33°55′	114°51′
44. Little Maria Mountains	33°53′	114°57′
45. Maria Mountains	33°52′	114°45′
46. Palen Mountains	33°54′	115°01′
47. Riverside Mountains Ver Planck, 1952	34°01′	114°29′

Imperial County

Undifferentiated gypsum-bearing rocks of Tertiary age

48. West slope Fish Creek Mountains	33°01′	116°04′
49. East slope Fish Creek Mountains	33°03′	116°02′
50. Coyote Mountains	32°45′	116°00′
50a. Coyote Mountains Ver Planck, 1952	32°48′	115°58′

San Diego County

Undifferentiated gypsum-bearing rocks of Teritary age

51. Fish Creek	33°04′	116°06′
52. Vallecito Mountains	33°04′	116°10′

San Bernardino County

Gypsite, Quaternary age

53. Danby Lake	34°14′	116°05′
54. Bristol Lake	34°30′	115°36′
55. Field	34°56′	116°32′
56. Calico Mountain	34°54′	116°50′

Undifferentiated gypsum-bearing rocks of Permian(?) age

57. Clark Mountain	35°36′	116°32′

Undifferentiated gypsum-bearing rocks of Tertiary age

58. Avawatz Mountains	35°36′	116°30′
59. Owl Hole Spring Ver Planck, 1952	35°40′	116°42′

Inyo County

Undifferentiated gypsum-bearing rocks of Tertiary age

60. China Ranch	35°52′	116°13′
61. Copper Canyon	36°07′	116°47′
62. Ryan	36°15′	116°37′
63. Furnace Creek	36°24′	116°50′

Shasta County

Anhydrite in veins associated with copper

64. Bully Hill mine	40°48′	122°12′

COLORADO

Larimer County

Lykins formation of Permian and Triassic age

1. Table Mountain	40°55′	105°11′
2. Greenacre Ranch	40°52′	105°11′
3. Owl Canyon	40°47′	105°12′
4. Dead Man Butte	40°54′	105°15′
5. West of Fort Collins	40°37′	105°12′
6. Arkins George, 1920	40°25′	105°12′

Douglas County

Lykins formation of Permian and Triassic age

7. Perry Park George, 1920	39°16′	104°56′

El Paso County

Lykins formation of Permian and Triassic age

8. Garden of the Gods Finlay, 1916	39°49′	104°52′

Pueblo County

Lykins formation of Permian and Triassic age

9. Sullivan Park — 39°30′ 104°50′
George, 1920

Fremont County

Morrison formation, Jurassic age

10. Beaver Creek — 38°32′ 104°58′
11. Eight Mile Creek — 38°33′ 105°05′
12. Salt Creek — 38°32′ 105°01′
George, 1920

Maroon formation, Pennsylvanian and Permian age

13. Swissvale — 38°30′ 105°57′
14. Badger Creek — 38°27′ 105°55′
15. Howard — 38°25′ 105°55′
16. Coaldale — 38°21′ 105°51′
Brill, 1944

Eagle County

Maroon formation of Pennsylvanian and Permian age

17. Avon — 39°39′ 106°35′
18. Eagle — 39°40′ 106°51′
19. West of Eagle — 39°41′ 106°54′
20. Gypsum — 39°42′ 106°58′
21. Dotsero — 39°41′ 107°02′
22. Ruedi — 39°22′ 106°45′
Burchard, 1911

Delta-Montrose Counties

Morrison formation, Jurassic age

23. Gunnison River — 38°40′ 107°52′
George, 1920

Mesa County

Moenkopi formation, Triassic age

24. Gateway — 38°39′ 108°56′
Shoemaker and Newman, 1959

Paradox member, Hermosa formation, Pennsylvanian age

25. Sinbad Valley — 38°32′ 108°58′
Shoemaker, 1956

Montrose County

Paradox member, Hermosa formation, Pennsylvanian age

26. East Paradox Valley — 38°15′ 108°46′
Cater, 1955a
27. West Paradox Valley — 38°20′ 108°55′
Withington, 1955
28. Big Gypsum Valley — 38°01′ 108°41′
Cater, 1955b
29. Little Gypsum Valley — 38°08′ 108°52′
Cater, 1955c

Dolores County

Paradox member, Hermosa formation, Pennsylvanian age

30. Rico — 37°40′ 108°02′
Ransome, 1901

Ouray County

Pony Express limestone member, Wanakah formation, Jurassic age

31. Portland — 38°06′ 107°42′
Burbank, 1930

Las Animas County

Morrison formation, Jurassic age

32. Chacuaco Creek — 37°29′ 103°37′
33. Johnny Branch — 37°35′ 103°14′
Duce, 1924

FLORIDA

Sumter County

Gypsite, Quaternary age

1. Panasoffkee — 28°48′ 82°06′
Day, 1904

Subsurface only:

Undifferentiated gypsum-bearing rocks of Cretaceous and Tertiary ages

Florida basin
Krumbein, 1951

IDAHO

Bear Lake County

Wells formation, Pennsylvanian and Permian age

1. Montpelier Canyon — 42°10′ 111°07′
Mansfield, 1927

Lemhi County

Undifferentiated gypsum-bearing rocks of Permian age

2. North of Gilmore — 44°31′ 113°05′

Washington County

Undifferentiated gypsum-bearing rocks of Pennsylvanian age

3. Snake River — 44°28′ 117°10′
4. Mineral — 44°37′ 116°59′
McDivitt, 1952

ILLINOIS

Subsurface only:

St. Louis limestone, Mississippian age; Joachim dolomite, Ordovician age

Illinois-Indiana basin
Krumbein, 1951; Saxby and Lamar, 1957

INDIANA

Martin County

St. Louis limestone, Mississippian age

1. Shoals	38°41′	86°44′
2. Shoals McGregor, 1954	38°43′	86°41′

Subsurface only:

St. Louis limestone, Mississippian age; Joachim dolomite Ordovician age

Illinois-Indiana basin
Krumbein, 1951

IOWA

Webster County

Fort Dodge gypsum of Permian age (McGee, 1884)

1. Fort Dodge	42°27′	94°14′
2. Fort Dodge	42°27′	94°09′
3. Fort Dodge	42°27′	94°05′
4. Fort Dodge	42°27′	94°03′
5. Fort Dodge	42°31′	94°10′
6. Fort Dodge Wilder, [1923]	42°31′	95°05′

Marion County (subsurface only)

St. Louis limestone and Warsaw limestone, Mississippian age

7. Bussey	41°11′	93°02′

Monroe County (subsurface only)

St. Louis limestone and Warsaw limestone, Mississippian age

8. Albia Dorheim and Campbell, 1958	41°01′	92°48′

Wapello County (subsurface only)

Wapsipinicon limestone, Devonian age

9. Ottumwa Dorheim and Campbell, 1958	41°00′	92°25′

Appanoose County (subsurface only)

St. Louis limestone, Mississippian age

10. Centerville Dorheim and Campbell, 1958	40°42′	92°53′

Des Moines County (subsurface only)

Wapsipinicon limestone, Devonian age

11. Burlington Dorheim and Campbell, 1958	40°49′	91°06′
12. Sperry Rock Products, 1959	40°54′	91°07′

KANSAS

Marshall County

Easley Creek shale, Permian age

1. North of Blue Rapids	39°43′	96°38′
2. South of Blue Rapids	39°39′	96°41′
3. West of Blue Rapids Kulstad and others, 1956	39°43′	96°42′

Saline County

Wellington formation, Permian age

4. South of Solomon	38°52′	97°24′
5. Salina	38°47′	97°33′

Gypsite, Quaternary age

6. Gypsum Kulstad and others, 1956	38°46′	97°24′

Dickinson County

Gypsite, Quaternary age

7. Dillon	38°39′	97°12′

Wellington formation, Permian age

8. Hope Kulstad and others, 1956	38°39′	97°11′

Barber County

Blaine formation, Permian age

9. Sun City Kulstad and others, 1956	37°17′	98°54′

KENTUCKY

Subsurface only:

St. Louis limestone, Mississippian age

Illinois-Indiana basin

LOUISIANA

Winn County

Salt dome cap rock

1. Winnfield Peck, 1956	31°56′	92°42′

Subsurface only:

Ferry Lake anhydrite, Cretaceous age

Ferry Lake basin

MICHIGAN

Kent County

Michigan formation, Mississippian age

1. Grandview — 42°55′ 85°46′
2. Grand Rapids — 42°58′ 85°46′
3. Grand Rapids — 42°56′ 85°44′
4. Grand Rapids — 42°58′ 85°41′
   Grimsley, 1904
5. Paris Township — 42°55′ 85°39′

Iosco County

Michigan formation, Mississippian age

6. National City — 44°14′ 83°46′
7. National City — 44°18′ 83°46′
   National Gypsum Co., 1959
8. Alabaster — 44°12′ 83°35′
   Lincoln, 1930

Mackinac County

Salina formation, Silurian age

9. St. Ignace — 45°53′ 84°43′
10. St. Ignace — 45°53′ 84°45′
    Smith and Stone, 1920

Charlevoix County

Salina formation, Silurian age

11. Beaver Island — 45°44′ 85°31′
    Smith and Stone, 1920

Subsurface only:

Detroit River group, Devonian age

Michigan basin
Cohee, 1944

MONTANA

Fergus County

Piper formation, Jurassic age

1. Heath — 47°00′ 109°16′
   Perry, 1949
2. Hanover — 47°07′ 109°32′
   Miller, 1959
3. Piper — 46°58′ 109°11′
   Gardner, 1959
4. Northwest of Tyler — 46°52′ 109°01′
   Stone and others, 1920

Judith Basin County

Otter formation, Mississippian age

5. Blacktail dome — 47°02′ 110°25′

Otter and Kibbey formations, Mississippian age

6. Lone Tree dome — 47°07′ 110°28′
   Vine, 1956

Kibbey sandstone, Mississippian age

7. East of Kibbey school — 47°08′ 110°40′

Otter formation, Mississippian age

8. East of Kibbey school — 47°08′ 110°40′

Kibbey sandstone, Mississippian age

9. West of Kibbey school — 47°08′ 110°44′

Otter formation, Mississippian age

10. West of Kibbey school — 47°08′ 110°44′
    Perry, 1949

Cascade County

Otter formation, Mississippian age

11. Goodman — 47°09′ 110°54′

Otter and Kibbey formations, Mississippian age

12. Riceville — 47°11′ 110°54′
    Great Northern Railway, 1959

Meagher County

Kibbey sandstone, Mississippian age

13. Freeman Creek — 46°54′ 111°21′
    Great Northern Railway, 1959

Big Horn County

Piper formation, Jurassic age

14. Big Horn River — 45°21′ 107°58′
    Richards, 1955

Chugwater formation, Permian and Triassic ages

15. Red Valley — 45°09′ 107°45′
    Knappen and Moulton, 1931

Carbon County

Chugwater formation, Permian and Triassic ages

16. North Red Dome — 45°17′ 108°45′
17. South Red Dome — 45°14′ 108°44′

Jefferson County

Undifferentiated gypsum-bearing rocks of Devonian age

18. Limespur — 45°52′ 111°51′
    Perry, 1949

Gallatin County

Chugwater formation, Permian and Triassic ages

19. Madison Range — 44°56′ 111°21′
    Perry, 1949

Madison County

Chugwater formation, Permian and Triassic ages

20. Gravelly Range — 44°54′ 111°47′
Perry, 1949

Beaverhead County

Big Snowy group, Mississippian age

21. Sheep Creek — 44°33′ 112°37′
22. West of Dell — 44°39′ 112°41′
Scholten and others, 1955

Subsurface only:

Charles formation, Mississippian age; Prairie formation, Devonian age

Williston basin
Lindsey, 1954

NEBRASKA

Dawes County

Brule formation, Oligocene age

1. Chadron — 42°50′ 102°50′
Dunham, 1955

NEVADA

Pershing County

Undifferentiated gypsum-bearing rocks of Triassic age

1. Empire — 40°32′ 119°15′
2. Lovelock — 40°10′ 118°20′
3. Table Mountain — 40°30′ 117°45′
Jones, 1920

Ormsby County

Undifferentiated gypsum-bearing rocks of Triassic age

4. Mound House — 39°13′ 119°41′
Jones, 1920

Lyon County

Undifferentiated gypsum-bearing rocks of Triassic age

5. Ludwig — 38°56′ 119°18′
Jones, 1920

Mineral County

Gypsum-bearing rocks of unknown age

6. Hawthorne — 38°35′ 118°40′
Rogers, 1912

Lincoln County

Moenkopi formation, Triassic age

7. Galt — 37°02′ 114°37′

Clark County

Kaibab limestone, Permian age

8. Blue Diamond — 36°05′ 115°26′
Holmes, 1950
9. Arden — 36°05′ 115°22′

Moenkopi formation, Triassic age

10. South end Frenchman Mountain — 36°12′ 114°57′
11. North end Frenchman Mountain — 36°17′ 114°59′

Undifferentiated gypsum-bearing rocks of Cretaceous age

12. East side Frenchman Mountain — 36°14′ 114°54′

Kaibab limestone, Permian age; Moenkopi formation, Triassic age

13. East of Crystal — 36°30′ 114°35′

Moenkipi formation, Triassic age

14. Southwest of Logandale — 36°30′ 114°26′
Bowyer and others,1958

Kaibab limestone, Permian age

15. Bird Spring Range, east side — 35°55′ 115°17′
16. Bird Spring Range, east side — 35°53′ 115°16′
Hewett, 1956
17. Moapa — 36°37′ 114°37′
Jones, 1920
18. Valley of Fire — 36°20′ 114°35′
Longwell, 1928

White Pine County

Undifferentiated gypsum-bearing rocks of Permian age

19. Northwestern White Pine County (subsurface only) — 39°45′ 115°30′
Lintz, 1954 (Location approximate)

NEW MEXICO

Sandoval County

Todilto limestone, Jurassic age

1. Ojo del Espiritu, Santa grant — 35°35′ 106°55′
2. White Mesa — 35°32′ 106°49′
3. Tongue — 35°23′ 106°22′
Weber and Kottlowski, 1959

Santa Fe County

Todilto limestone, Jurassic age

4. Rosario — 35°29′ 106°13′
Weber and Kottlowski, 1959

Bernalillo County

Todilto limestone, Jurassic age

5. Canoncito — 35°09′ 106°20′
Weber and Kottlowski, 1959

Valencia County

Todilto limestone, Jurassic age

6. Mesita 35°01′ 107°15′
7. Suwanee 34°51′ 107°06′

Yeso formation, Permian age

8. Mesa Lucero 34°47′ 107°07′
Weber and Kottlowski, 1959

Socorro County

Yeso formation, Permian age

9. Riley 34°28′ 107°11′
10. Mesa del Yeso 34°14′ 106°36′
Weber and Kottlowski, 1959

Guadalupe County

San Andres limestone, Permian age

11. Vaughn 34°40′ 105°13′
Weber and Kottlowski, 1959

Lincoln County

San Andres limestone, Permian age

12. Ancho 33°55′ 105°44′
Weber and Kottlowski, 1959

Torrance County

Yeso formation, Permian age

13. Abo 34°27′ 106°18′

Gypsum dune sand, Quaternary age

14. Estancia Valley 34°40′ 106°55′

Yeso formation, Permian age

15. Willard 34°27′ 105°56′

Gypsum dune sand, Quaternary age

16. Encino 34°35′ 105°26′
17. Pinos Wells 34°30′ 105°36′
Weber and Kottlowski, 1959

Otero-Dona Ana Counties

Gypsum dune sand, Quaternary age

18. White Sands 32°55′ 106°15′
Weber and Kottlowski, 1959

Sierra County

Yeso formation, Permian age

19. Caballo Mountains 33°00′ 107°10′
20. Southeast Caballo Mountains 32°50′ 107°08′
Weber and Kottlowski, 1959

Socorro County

Yeso formation and San Andres limestone, Permian age

21. Nogal Creek 33°32′ 107°12′

Lincoln County

Yeso formation, Permian age

22. Phillips Hill 33°25′ 106°06′
Weber and Kottlowski, 1959

Otero County

Yeso formation, Permian age

23. Salinas 33°12′ 105°59′
24. Hueco Mountains 32°06′ 105°50′
Weber and Kottlowski, 1959

Dona Ana County

Undifferentiated gypsum-bearing rocks of Pennsylvanian age

25. North Franklin Mountains 32°01′ 106°32′
Weber and Kottlowski, 1959

Chaves County

Undifferentiated gypsum-bearing rocks, Guadalupe series, Permian age

26. Acme 33°34′ 104°20′
Weber and Kottlowski, 1959

Eddy County

Castile formation, Permian age

27. Black River 32°03′ 104°26′
Weber and Kottlowski, 1959

Subsurface only:

Supai formation, Pennsylvanian and Permian age

Supai basin
Lang, 1957

Paradox member, Hermosa limestone, Pennsylvanian age

Paradox basin
Lang, 1957

NEW YORK

Erie County

Salina formation, Silurian age

1. Buffalo 42°58′ 78°54′
Pohlman, 1888
2. Clarence Center 43°00′ 78°39′
3. Clarence Center 43°00′ 78°34′
4. Akron 43°01′ 78°29′
Newland, 1929

Genesee County

Salina formation, Silurian age

5. Indian Falls 42°59′ 78°23′
6. Oakfield 43°01′ 78°22′
7. Bascom and vicinity 43°01′ 78°26′
8. Fort Hill 42°59′ 77°59′
Newland, 1929

Monroe County

Salina formation, Silurian age

9. Wheatland	43°00′	77°45′
10. Belconda and Beulah	43°00′	77°54′
11. Mumford Newland, 1929	42°59′	77°50′

Ontario County

Salina formation, Silurian age

12. Victor	42°58′	77°26′
13. Victor	42°58′	77°28′
14. Phelps	42°58′	77°05′
15. Port Gibson Newland, 1929	43°00′	77°14′

Wayne County

Salina formation, Silurian age

16. Newark Newland, 1929	43°01′	77°06′

Seneca County

Salina formation, Silurian age

17. Nicols Corners Newland, 1929	42°58′	76°50′

Cayuga County

Salina formation, Silurian age

18. Cayuga	42°56′	76°44′
19. Cross Roads	42°54′	76°42′
20. Union Springs Newland, 1929	42°53′	76°42′

Onondaga County

Salina formation, Silurian age

21. Martisco	43°01′	76°25′
22. Marcellus	43°00′	76°23′
23. Camillus	43°01′	76°19′
24. DeWitt	43°01′	76°05′
25. Fayetteville Newland, 1929	43°00′	75°59′

Madison County

Salina formation, Silurian age

26. Chittenango	43°00′	75°52′
27. Chittenango	43°00′	75°50′
28. Cottons	43°00′	75°47′
29. Perryville	43°00′	75°45′
30. Clockville	43°00′	75°41′
31. Wampsville	43°04′	75°40′
32. Stockbridge Newland, 1929	43°01′	75°36′

St. Lawrence County

Grenville series, Precambrian age

33. Balmat Brown and Engel, 1956	44°15′	75°24′

NORTH DAKOTA

Subsurface only:

Gypsum Spring formation, Jurassic age; Spearfish formation, Permian and Triassic ages; Charles formation, Mississippian age; Prairie formation, Devonian age; Whitewood and Bighorn dolomites, Ordovician age.

Williston basin
Lindsey, 1954; Krumbein, 1951

OHIO

Ottawa County

Salina formation, Silurian age

1. Southeast of Port Clinton	41°30′	82°53′
2. Gypsum	41°29′	82°52′
3. Gypsum Bownocker, 1920	41°31′	82°52′

Erie County

Salina formation, Silurian age

4. Castalia Bownocker, 1920	41°25	82°50′

Lucas County

Salina formation, Silurian age

5. Sylvania	41°43′	83°42′

OKLAHOMA

Woodward County

Blaine formation, Permian age

1. West of Heman Burwell, 1955	36°31′	98°59′

Major County

Blaine formation, Permian age

2. Gypsum Creek Burwell, 1955	36°13′	98°30′

Blaine County

Blaine formation, Permian age

3. West of Okeene	36°09′	98°21′
4. Southard	36°04′	98°27′
5. Bucher	35°56′	98°19′
6. West of Altona Snider, 1920	35°45′	98°12′

Custer County

Cloud Chief formation, Permian age

7. Weathersford	35°32′	98°44′
8. Clinton Ham and Curtis, 1958	35°20′	98°56′
Gypsite, Quaternary age		
9. Indianapolis Snider, 1920	35°32′	98°54′
Caddo County		
Cloud Chief formation, Permian age		
10. Cement Snider, 1920	34°55′	98°11′
Grady County		
Gypsite, Quaternary age		
11. Rush Springs Snider, 1920	34°45′	98°00′
Beckham County		
Blaine formation, Permian age		
12. Carter Scott and Ham, 1957	35°11′	99°32′
Greer County		
Gypsite, Quaternary age		
13. Haystack Creek	35°00′	99°34′
Blaine formation, Permian age		
14. Haystack Mountain Snider, 1920	35°02′	99°40′
Harmon County		
Blaine formation, Permian age		
15. Elm River Snider, 1920	34°57′	99°55′
Jackson County		
Blaine formation, Permian age		
16. Olustee	34°35′	99°25′
Gypsite, Quaternary age		
17. Duke	34°40′	99°35′
18. Eldorado Snider, 1920	34°30′	99°37′

OREGON

Baker County		
Undifferentiated gypsum-bearing rocks of Pennsylvanian age		
1. Burnt River Moore, 1937	44°25′	117°14′
Crook County		
Gypsite, Quaternary age		
2. 30 miles east of Bend Oregon State Bureau Mines, 1912	44°06′	120°47′

SOUTH DAKOTA

Custer County		
Spearfish formation, Permian and Triassic age		
1. Hells Canyon	43°38′	103°55′
2. Elk Mountain, north end Darton and Paige,1925	43°36′	104°00′
Minnelusa formation, Pennsylvanian and Permian age		
3. Hells Canyon Bowles and Wolcott, 1959	43°45′	103°56′
Fall River County		
Spearfish formation, Permian and Triassic age		
4. Red Canyon	43°28′	103°49′
5. Alabaugh Canyon Darton, 1904b	43°26′	103°40′
6. Erskin	43°25′	103°34′
7. Hot Springs	43°24′	103°30′
8. Alabaster South Dakota State Planning Board [1936]	43°26′	103°29′
9. Cold Brook Canyon	43°27′	103°30′
Custer County		
Spearfish formation, Permian and Triassic age		
10. Hermosa Darton and Paige, 1925	43°50′	103°18′
Pennington County		
Spearfish formation, Permian and Triassic age		
11. Rapid City	44°05′	103°14′
12. Rapid City	44°09′	103°15′
Meade County		
Spearfish formation, Permian and Triassic age		
13. Black Hawk	44°11′	103°17′
14. Tilford	44°14′	103°21′
15. Piedmont Hutton, 1920	44°17′	103°24′
16. Sturgis South Dakota State Planning Board [1936]	44°21′	103°28′
Lawrence County		
Spearfish formation, Permian and Triassic age		

17. Crook — 44°27′ 103°37′
South Dakota State Planning Board [1936]

18. Centennial Prairie — 44°31′ 103°40′
Hutton, 1920

19. Spearfish — 44°30′ 103°52′
South Dakota State Planning Board [1936]

Gypsum Spring formation Jurassic age

20. Spearfish — 44°31′ 103°47′
Mapel and Bergendahl, 1956

TEXAS

Harris County

Salt dome cap rock

1. Hockley — 30°02′ 95°54′
Stenzel, 1943

Brooks County

Salt dome cap rock

2. Falfurrias — 27°13′ 98°05′
Corpus Christi Geol. Soc., 1957

Gillespie County

Edwards limestone, Cretaceous age

3. Fredericksburg — 30°23′ 98°58′
Barnes, 1943

Menard County

Edwards limestone, Cretaceous age

4. Menard — 30°54′ 99°49′
Barnes, 1943

Nolan County

Blaine formation, Permian age

5. Sweetwater — 32°26′ 100°14′
Meschter, 1958

5a. Sweetwater — 32°29′ 100°14′

Fisher County

Blaine formation, Permian age

6. Longworth — 32°37′ 100°20′

7. Rotan — 32°50′ 100°19′
Dunn, 1948

Harden County

Blaine formation, Permian age

8. Acme — 34°23′ 99°47′

Hudspeth County

Briggs formation of Albritton (1938), Permian age

9. Briggs, north end Malone Mountains — 31°19′ 105°50′

10. Torcer, Malone Hills — 31°19′ 105°47′

11. South end Malone Mountain — 31°17′ 105°50′
Albritton, 1938

Culberson County

Gypsum dune sand of Quaternary age

12. Salt Flat — 31°25′ 104°42′
Richardson, 1914

Subsurface only:

Ferry Lake anhydrite, Cretaceous age

Ferry Lake basin

UTAH

Grand County

Paradox member, Hermosa formation, Pennsylvanian age

1. Onion Creek Valley — 38°43′ 109°17′
Dane, 1935

2. Castle Valley — 38°37′ 109°15′
Baker and others, 1933

3. Salt Valley — 38°45′ 109°35′
Dane, 1935

4. Moab Valley — 38°43′ 109°43′

5. Spanish Valley — 38°35′ 109°25′
Baker and others, 1933

Emery-Wayne Counties

Carmel formation, Summerville formation, Jurassic age

6. South of Cedar Mountain — 39°13′ 110°46′

7. Fullers bottom, San Rafael River — 39°07′ 110°49′

8. Horn Silver Gulch — 39°00′ 110°50′

9. Cold Wash — 38°58′ 110°50′

10. Colt Gulch — 38°51′ 111°02′

11. Muddy Creek — 38°47′ 111°05′

12. Last Chance — 38°30′ 111°09′

13. Caineville — 38°26′ 111°04′

14. Notom — 38°14′ 111°10′
Gilluly, 1929; Lupton, 1913

Sevier County

Arapien shale, Jurassic age

15. Sigurd — 38°50′ 111°52′

16. Sigurd — 38°52′ 111°50′
Bell, 1953

Juab County

Arapien shale, Jurassic age

17. Nephi — 39°44′ 111°46′
Boutwell, 1904

Millard County

Gypsum dune sand, Quaternary age

18. White Mountains — 38°55′ 112°28′
Gilbert, 1890

Tooele County

Gypsum dune sand, Quaternary age

19. South end Great Salt Lake — 40°39′ 112°20′
Jones, 1953

Iron County

Curtis formation, Jurassic age

20. Cedar City — 37°42′ 112°59′

21. Kanarraville, east and southeast — 37°32′ 113°03′
Stone and Lupton, 1920

Kane County

Curtis formation, Jurassic age

22. Walker Ranch, North Fork Virgin River — 37°24′ 112°49′

23. Glendale — 37°19′ 112°32′

Washington County

Curtis formation, Jurassic age

24. East flank Pine Valley Mountains — 37°24′ 113°20′

Moenkopi formation, Triassic age

25. Bloomington — 37°04′ 113°30′

26. Purgatory — 37°11′ 113°23′

27. Toquerville — 37°17′ 113°15′

28. LaVerkin — 37°06′ 113°13′
Stone and Lupton, 1920

San Juan County

Moenkopi formation, Triassic age

29. Gypsum Canyon — 37°57′ 110°00′

30. 20 miles southeast of Mexican Hat — 37°04′ 109°33′
Anthony and others, 1955

Paradox member, Hermosa formation, Pennsylvanian age

31. Gypsum Canyon — 37°58′ 110°05′

32. San Juan River Canyon — 37°18′ 110°08′

33. San Juan River Canyon — 37°13′ 109°50′
Wengerd and Matheny, 1958

VIRGINIA

Washington County

Maccrady(?) shale, Mississippian age

1. Plasterco — 36°53′ 81°47′
Stose, 1920

Smyth County

Maccrady(?) shale, Mississippian age

2. North Holston — 36°54′ 81°44′

3. Broad Ford — 36°55′ 81°41′
Stose, 1920

WASHINGTON

Okanogan County

Gypsite, Quaternary age

1. Poison Lake — 48°48′ 119°37′

2. Nighthawk Lake — 49°00′ 119°37′
Valentine, 1949

WYOMING

Weston County

Spearfish formation, Permian and Triassic age

1. L. A. K. Ranch — 43°45′ 104°02′

2. East of Newcastle — 43°50′ 104°05′

3. Mt. Pisgah — 43°52′ 104°03′

4. Oil Creek Valley — 44°01′ 104°14′

5. Strawberry Mountain — 44°07′ 104°17′
Darton, 1940a

Crook County

Spearfish formation, Permian and Triassic age

6. Inyan Kara Mountain — 44°13′ 104°19′

7. Gypsum Buttes — 44°21′ 104°20′

8. Sundance Mountain — 44°24′ 104°24′

9. Green Mountain — 44°28′ 104°18′

10. Aladdin — 44°34′ 104°13′

11. Beulah — 44°31′ 104°06′
Darton, 1905

Sheridan County

Chugwater formation, Permian and Triassic age

12. Pass Creek — 44°57′ 107°30′

13. Dayton — 44°50′ 107°21′

14. Beaver Creek — 44°40′ 107°09′
Darton, 1906a

Johnson County

Chugwater formation, Permian and Triassic age

15. Rock Creek — 44°20′ 106°47′

16. Middle Fork, Crazy Woman Creek — 44°11′ 106°49′

17. South Fork, Crazy Woman Creek — 44°03′ 106°49′

18. North Fork, Powder River — 43°55′ 106°56′

19. Red Creek — 43°46′ 106°56′

20. Barnum Darton, 1906a	43°32′	106°54′

Washakie County

Chugwater formation, Permian and Triassic age

21. No Wood	43°33′	107°32′
22. Red Bank	43°44′	107°18′
23. Big Trail	43°50′	107°17′
24. Otter Creek	43°57′	107°21′
25. Tensleep Lupton and Condit, 1916	44°03′	107°25′

Big Horn County

Chugwater formation, Permian and Triassic age

26. Zeisman Ranch	44°10′	107°27′
27. Hyattville	44°15′	107°30′
28. Shell Canyon	44°33′	107°45′
29. Stucco Lupton and Condit, 1916	44°31′	108°04′

Park County

Chugwater formation, Permian and Triassic age

30. Clark Fork	44°47′	109°21′

Gypsum Spring formation, Jurassic age

31. Trail Creek	44°35′	109°16′
32. Rattlesnake Mountain	44°32′	109°13′
33. Horse Center anticline	44°28′	109°04′
34. 10 miles south of Cody	44°25′	109°00′

Gypsite associated with sulfur, Quaternary age

35. Cody Love and others, 1945; Osterwald and others, 1959	44°31′	109°05′

Hot Springs County

Chugwater formation, Permian and Triassic age

36. Thermopolis Collier, 1920	43°43′	108°08′
37. Red Creek Osterwald and others, 1959	43°38′	108°15′
38. North flank, Owl Creek Mountains Darton, 1906b	43°40′	108°48′

Fremont County

Gypsum Spring formation, Jurassic age

39. Absaroka Mountains Love, 1939	43°31′	109°09′
40. Sheep Creek	43°31′	108°42′
41. Lander	42°51′	108°49′
42. Sage Creek	42°56′	108°45′
43. Conant Creek Osterwald and others, 1959	42°49′	108°08′
43a. Fort Washakie Jamison, 1911	43°00′	109°00′

Teton County

Amsden and Brazer formations undifferentiated, Mississippian and Pennsylvanian ages

44. Hoback Canyon	43°18′	110°37′
44a. Cream Puff Mountains Wanless and others, 1955	43°20′	110°37′

Natrona County

Chugwater formation, Permian and Triassic age

45. Rattlesnake Mountain	42°54′	107°23′
46. North flank Casper Mountain	42°45′	106°11′
47. Alcova Reservoir	42°30′	106°42′
48. Alcova Reservoir	42°32′	106°40′
49. South flank, Casper Mountain Osterwald and others, 1959	42°38′	106°17

Carbon County

Chugwater formation, Permian and Triassic age

50. Freezout Hills	42°07′	106°52′
50a. 12 miles north Rawlins	41°56′	107°20′
51. West end Como Ridge	41°53′	106°06′
52. Medicine Bow River near Difficulty	42°00′	106°13′
53. Elk Mountain Osterwald and others, 1959	41°38′	106°33′

Converse County

Chugwater formation, Permian and Triassic age

54. South of Douglas	42°42′	105°23′
55. South of Douglas	42°39′	105°24′
56. South of Glen Rock Osterwald and others, 1959	42°43′	105°53′

Platte County

Chugwater formation, Permian and Triassic age

57. Horseshoe Creek, south of Glendo	42°28′	105°05′
58. Deadhead Creek, east flank Lawrence Range Osterwald and others, 1959	41°43′	105°15′

Albany County

Chugwater formation, Permian and Triassic age

59. Como Ridge Dunbar, 1944	41°54′	105°59′
60. Marshall area	42°09′	105°51′
61. Sand Creek	41°04′	105°45′
62. Red Mountain	41°04′	105°54′
63. Sportsman Lake	41°13′	105°37′
64. Red Buttes Darton and others, 1910	41°16′	105°37′
65. Northeast of Laramie	41°24′	105°32′

Gypsite, Quaternary age

66. South of Laramie Stone and others, 1920	41°18′	105°35′

Sweetwater County

Gypsite, Quaternary age

67. Southeast end Wind River Mountains Stone and others, 1920	42°10′	108°04′

Crook County

Gypsum Spring formation, Jurassic age

68. Beaver Creek	44°47′	104°28′
69. Bush Canyon	44°42′	104°31′
70. Hulett	44°40′	104°35′
71. Lytle Creek Mapel and Bergendahl, 1956	44°36′	104°36′

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