

ANHYDRITE



A mineral of highly varied paragenesis. In Michigan there are three main types of occurrences: 1) sparingly in some native copper deposits as a mineral of the late ore-forming stage; 2) as a rare constituent in some manganese quartz veins in iron formation; and 3) crystals and granular or massive layers in the halite (salt) deposits of the Detroit River and Salina Groups. Also in lower parts of the Michigan Formation grading upward into gypsum.

The list of wells that follows is by no means the total number of well occurrences in which the Salina Group and Michigan Formation have been penetrated and in which anhydrite has been recognized. Most deep wells drilled in the central part of the Michigan Basin encounter varying thicknesses of anhydrite from one or more formations of the Detroit River or Salina Groups. Northern and Southern Peninsulas.

Bay County: 1. Bay City well: In Michigan Formation at 700 feet. 2. Kawkawlin well: In Grand Rapids Group at 400 feet (Grimsley, 1904a, b) (T. S. Knapp, written communication, 1978).

Berrien County: 1. Niles well: A 6 meter bed of Salina anhydrite and gypsum at 615 feet. 2. Benton Harbor well: Salina Group at 815 feet.

Gratiot County: 1. Alma wells: 35 feet of Michigan Formation at 895 feet. 2. St. Louis well (T. S. Knapp, written communication, 1978).

Houghton County: 1. Huron mine: Pale lavender crystals similar to those from the Isle Royale mines (q.v.). 2. *Numbers 4, 5, and 6 Isle Royale mines:* Lilac-colored crystals found in copper lodes occurring in vugs and replacement of the host rock. It is associated with siderite, gypsum, and dolomite and veined by laumontite and epidote (Butler and Burbank, 1929; Spiroff, 1938, 1964), especially below 12th level.

Isabella County: 1. Mt. Pleasant wells: In Michigan Formation at 1,125 feet. 2. Midland brine wells: In Michigan Formation between 1,225 and 1,380 feet. 3. Crystals in vugs in cores from the Rogers City Formation. Coldwater oil field,

T16N, R6W. (T. S. Knapp, written communication, 1978).

Kalamazoo County: Kalamazoo well: In Salina Group at 1,500 feet.

Kent County: Grand Rapids: Sparse occurrence with gypsum (Dana, 1892).

Keweenaw County: Cliff mine: Replacing prehnite with chlorite and gypsum, and associated with chalcocite crystals (Williams, 1966).

Macomb County: Mt. Clemens well: In Salina Group at 980 feet.

Manistee County: Manistee well: In Detroit River Group at about 1800 feet.

Marquette County: 1. Beacon iron mine. (Dorr and Eschman, 1970). 2. Champion iron mine: Found in manganese-rich Negaunee Iron Formation (Babcock, 1966a, b). Babcock found two large anhedral of pale purple anhydrite with inclusions of hematite and molybdenite and rimmed by manganoan siderite in a cockade structure. Also found associated with cummingtonite (T. M. Bee, personal communication, 1999).

Mason County: At Ludington in numerous wells: In Detroit River Group at about 2,050 feet.

Mecosta County: Crystals in vugs in cores from the Reed City zone of the Dundee Formation in the Hardy Dam oil field, T13N, R10W (T. S. Knapp, written communication, 1978). Massive anhydrite serves as a caprock in this field.

Midland County: Midland wells: Nearly pure white anhydrite bed 24 meters thick found in the Michigan Formation at 970 feet (Grimsley, 1904a, b).

Monroe County: Milan wells: In Salina Group beginning at 1,050 feet and becoming massive at 1,210 feet.

Muskegon County: Muskegon well: In Saline Formation at 2,350 feet.

Newaygo County: Glen Bradley Number 4 well, section 11, T12N, R13W: Found as thin lamellae in halite in the Saline Formation (Dellwig and Briggs, 1953; Dellwig, 1955).

Ogemaw County: Brazos-Sun-Superior Number 1 well, SW ¼ SE ¼ SE ¼ section 28,

T24N, R2E: Anhydrite has been identified and logged in the Eau Claire member of the Munising Formation (Cambrian). Between 11,710 and 12,996 feet some 90 beds of anhydrite, 0.3 to 3 meters thick, are recorded. They consist of anhydrite, with or without pyrite, in dolomite; or beds of silty, dolomitic anhydrite with local traces of pyrite (E. Evenson, personal communication, based on logs on file at the DNR-Geological and Land Management Division).

Ontonagon County: Mass mine.

Osceola County: Crystals in vugs in secondary dolomite of the Rogers City Formation. Well in Orient Township, section 29, T17N, R7W (T. S. Knapp, written communication, 1978).

St. Clair County: 1. Marine City well: Found in the Salina Group at 1,400 feet. 2. St. Clair wells: In Salina Group at 1,510 feet (Grimsley, 1904a, b). 3. Well 6.5 km north of Lake Saint Clair's Anchor Bay in sections 22 and 27, T4N, R15E: Salina Group core with interbedded halite and dolomite between 1,500 to 2,000 feet (Sharma, 1966).

Wayne County: 1. Wyandotte wells: In Salina Group beginning at 590 feet and especially near 750 feet. 2. Wells near Trenton: In Salina Group beneath 690 feet. 3. International Salt Company, Inc. mine at Detroit. Found in Salina Group as conspicuous dark single layers or aggregations of several layers of very thin lamellae of gray anhydrite separated by zones of lighter colored halite of variable thickness. Four or five anhydrite lamellae may be crowded in a vertical interval of only a centimeter; several such groups may constitute a single dark band; or one or two lamellae may occur within a dark band. A few anhydrite lamellae are locally as much as a millimeter thick. Anhydrite lamellae also occur in the intervening clear thick halite bands separating the darker layers, but these are megascopically not observable until selective solution of the halite leaves the anhydrite lamellae projecting in relief (Kaufman and Slawson, 1950). In the thin lamellae the anhydrite appears as very fine-grained, stubby, rectangular crystals and as fine needle-like crystals, possibly pseudomorphous after gypsum (Dellwig, 1955).

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UPDATE

Iron County: Bristol mine, Crystal Falls: As colorless to white platy cleavages and crystal sections 2-3 cm across embedded in gypsum.

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