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POTOSI LEAD-ZINC AREA, GRANT COUNTY, WISCONSIN

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Location and history

The Potosi area is a part of the upper Mississippi Valley lead-zinc district. It is located along the Mississippi River, about 12½ miles north of Dubuque, Iowa, and 11 miles west of the present zinc-producing part of southwestern Wisconsin. Between 1840 and 1880 the Potosi area was one of the most actively mined lead areas in the entire district, the total production during this time being approximately 25,000 tons of galena. Zinc, also, has been mined immediately north and east of Tennyson, and although the amount produced is not known, the quantity of material on the dumps points to operations of fair size. Recent investigations by geologists of the Geological Survey, U. S. Department of the Interior, indicate that this is an excellent area for further prospecting for zinc ore.

General geology

The lead and zinc ores occur in the Galena dolomite, of Ordovician age. In general this formation consists mainly of cherty dolomite, but it becomes less cherty and less dolomitic near its base. It has an average thickness of 232 feet. It may be divided into five lithologic members, the popular terms for which are given in quotation marks below:

"Yellow sandy"--Limestone, medium-grained, moderately dolomitic	117 ft.
"Drab"--Dolomite, cherty, coarse-grained, dense	85 "
"Gray"--Limestone, sandy, coarse-grained, somewhat mottled; chert rare	10 "
"Blue"--Limestone, sandy, bluish-gray, coarse-grained, strongly mottled	10 "
"Oil rock"--Pink, fine-grained, very pure limestone, and chocolate-brown oil shale	10 "
	232 "

Beneath the "oil rock" lies the Ordovician Platteville limestone, of which only the top two members need be mentioned. The uppermost is

a blue-green shale, known as the "clay bed," which is from a few inches to 3 feet in thickness. Beneath the "clay bed" is 2 to 10 feet of a salmon-colored, compact, pure, fine-grained limestone, known as "glass rock," which breaks with a conchoidal fracture.

Ore deposits

Both the Galena dolomite and the upper members of the Platteville limestone contain deposits of lead and zinc ore. In general the lead deposits are found above the zinc deposits, usually in the middle of the "drab" member of the Galena dolomite. In the upper Mississippi Valley district, zinc deposits of workable size are generally found near the base of this formation, either in the "gray," "blue," or "oil rock" members or in the upper two members of the Platteville limestone. In the Potosi area the only known zinc deposits are in the lower part of the "drab" and in the "gray" members of the Galena dolomite. The underlying "oil rock" and "clay bed" have never been prospected in the Potosi area, despite the fact that in other parts of the district these lower beds contain the largest and most profitable zinc deposits. Similar deposits might well be found in the "oil rock" and the "clay bed," and even in the glass rock of the Potosi area if these units were explored.

The minerals of the upper Mississippi Valley zinc deposits are few. The one commercial ore mineral of lead is galena (lead sulfide), which has a steely luster and cubical cleavage. The zinc is found in commercial quantity as a constituent of two minerals. One of these is sphalerite (zinc sulfide), locally known as "jack" or "blackjack," which has a brown color and resinous luster; the other is the weathering product smithsonite (zinc carbonate), locally known as "drybone" or "bone," which is gray to brown and forms stony or porous masses of irregular shape. The associated metallic minerals are pyrite and marcasite, iron sulfides locally called "sulfur"; the gangue minerals are calcite (calcium carbonate), known in this district as "tiff"; and barite (barium sulfate).

Lead ore is generally found lining the walls of fissures or irregular cavities, or loose in such openings. Lead-bearing fissures are commonly long, regular, nearly vertical joints or minor fault planes. Most of the lead-bearing joints in the Potosi area have strikes ranging from N. 55° W. to N. 75° W. Many may be traced along the surface by linear series of old pits, shafts, and dumps. Prominent mineralized fissures are known locally as "ranges."

Where information is available, the zinc ore bodies appear to follow the same trends as the lead-bearing fissures, and the surface above them is pocked with old lead pits. These facts indicate that there is a better chance of finding zinc ore bodies beneath the lead "ranges," or in their immediate vicinity, than elsewhere. The zinc

ore occurs here in elongate, flat-lying bodies, generally several hundred feet in length, 30 to 50 feet wide, and probably 12 to 20 feet thick vertically. The ore is in a breccia, the zinc sulfide coating and cementing fragments of dolomite along a zone of fractures.

The larger structural features of the area include parts of several synclinal basins and anticlinal noses. Bodies of zinc ore may be located almost anywhere in relation to these structures, but experience appears to show that the chances for finding them are better either at the ends of the basins or along the limbs, where the dip is the steepest and the tendency to fracture greatest.

It is impossible to give accurate figures as to grade, but the last operations in the area are said to have yielded ore averaging about 7 percent zinc.

Geologic and geographic factors in prospecting and development

The first step in prospecting for zinc is to locate an area that is structurally favorable and contains surface lead workings. The old dumps should be examined for traces of zinc ore. The property may then be drilled with the churn drill. All holes should be drilled at least to the "clay bed," and preferably to the base of the "glass rock." The depth to the top of the "clay bed" in the area ranges from 100 to 250 feet. The structure contours on the map indicate the altitude above sea level of the top of the "clay bed," and the probable depth of that horizon at any given point may be obtained by subtracting this altitude from that of the surface (as indicated by the surface contours) at the same point. Drilling is generally most informative and least expensive if the first holes put down lie in a line at right angles to the probable general trend of the ore body. For most of this area this trend can be inferred from the fissures shown on the map. The holes should be spaced not more than 40 or 50 feet apart. If no ore is found along such a line of drill holes, it is improbable that any extensive ore bodies are present.

The ores in this area, though of high grade, are difficult to concentrate, because of their peculiar association with breccia. Ordinary hand cobbing followed by jiggling is not economical. The area is at too great a distance from the custom flotation mill at Cuba City, Wis., to justify trucking the run-of-mine ore or even a rough, low-grade concentrate. It would be prudent, therefore, to delay mining operations until an ore body of fairly large tonnage has been blocked out and the erection of a small flotation plant at the mine is justified. The fine crushing done in such a mill would greatly decrease the waste of zinc-bearing rock, in addition to reducing the shipping cost for the concentrate.