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SELECTED DEVELOPMENTS IN WISCONSIN'S MINERAL INDUSTRY IN 1988

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1989

INTRODUCTION

This is the first of a new series of annual reports about the mineral industry in Wisconsin. Not all of the events affecting Wisconsin's mineral industry have been included in this report; only significant events from the past calendar year that appear to have lasting impact on the future of the mineral industry in the state are included.

This report replaces reports previously published by two agencies. The summary of *Metallic Mineral Exploration in Wisconsin* was published annually by the Wisconsin Geological and Natural History Survey; this series was based on drillhole abandonment reports available from the Wisconsin Department of Natural Resources. The *Mineral Transactions Activity and Terms in Wisconsin*, an annual survey of minerals leasing prepared by Duncan Harkin, was published by the Department of Agricultural Economics, University of Wisconsin-Madison.

SIGNIFICANT DEVELOPMENTS IN 1988

Nonmetallic minerals

New ordinances adopted. In 1988 Marathon and Oneida Counties adopted new ordinances that established county-wide regulations for nonmetallic mineral extraction operations within their borders. Both ordinances provide for reclamation of nonmetallic mining operations and institute a permit process for their regulation. The Marathon County ordinance was developed over several years of extensive discussion among county officials, mining company officials, and other citizens. However, at the end of 1988, the ordinance was being reviewed and is expected to be modified in 1989. Primary concerns in this late review are the costs of permit fees and the specificity of certain ordinance regulations. Oneida County's ordinance was adopted in December 1988 as a companion ordinance to a metallic mining and prospecting ordinance.

Talc mining proposed. In December 1988 the Wisconsin Department of Natural Resources (DNR) turned down a proposal for the acquisition of a parcel of state-owned land for the purpose of developing a talc mine. Such development, according to Carroll D. Besadny, DNR Secretary, would be "incompatible with the existing use of the property as part of the Mead Wildlife Area." This decision closed, at least temporarily, discussions between an individual, operating on behalf of an unnamed company, and the DNR regarding: 1) an exchange of land parcels from within and next to the Mead Wildlife Area; 2) a lease covering the development of talc resources in the area; and 3) the eventual return of mined lands following their reclamation to the Mead Wildlife Area.

The DNR decision not to exchange 80 acres along the southeast corner of the Mead Wildlife Area for a 120-acre tract of similar land farther west, but contiguous to the wildlife area, concluded more than 18 months of discussion within the DNR about the extent of state authority to lease state-owned lands or to otherwise convey the mineral rights on such lands. The 80-acre parcel would have subsequently returned to full state control following reclamation of the site. Because the extraction of a nonmetallic mineral is not specifically regulated by the state, the proposal would have used stipulations within a contract or lease to guarantee reclamation of the site to specific standards.

Metallic minerals

Section 144.839, Wisconsin Statutes. Within its annual budget bill, the 1988 Wisconsin Legislature included a provision that authorizes negotiated agreements between a potential applicant for a metal-mining permit and local

units of government that would be affected by the project. Specific allowance for such negotiated agreements is the single most important development for future metallic mining activity in 1988 for the following reasons:

- 1) Agreements permit mining companies to respond to local concerns early in the mine-development process, thus allowing companies to evaluate local support and interest and to identify major local concerns before additional development expenses are incurred for the proposed project.
- 2) Local units of government can become involved early in the mine project, thus insuring that local concerns are heard and evaluated before state regulatory structures have begun to address specifics of the project.
- 3) Metallic mining projects that have early local support would appear to have a better chance of eventual approval as the project evaluation proceeds at the state level.

Kennecott's Flambeau project. Kennecott Minerals Company, a subsidiary of BP America, Inc., has been actively engaged in developing a small, massive-sulfide orebody south of the City of Ladysmith in Rusk County. The current project envisions a small (32-acre) open-pit mine from which the secondary enrichment zone within the orebody will be extracted. Within this zone, copper values average 9 to 10 percent copper metal with small but important quantities of gold. The project calls for extraction of 1.9 million tons of ore, crushed at the mine site, and shipped to an out-of-state facility for metals recovery.

In 1988, Kennecott completed negotiations for a local agreement with the Town of Grant, City of Ladysmith, and Rusk County. Features of the local agreement include guarantees of 75 percent local employment, private-well water quality and quantity protection, and a guarantee of property values near the mine area. Various environmental baseline monitoring programs were completed in 1988. Work on necessary permits and the environmental impact report began during 1988, and the company intends to submit completed permit applications in April 1989.

Oneida County leasing program. The Oneida County Board of Supervisors, through its Forestry and Outdoor Recreation Committee, worked on a new competitive leasing program for county-owned mineral holdings within the county forest. The program was essentially finished in December 1988 with the adoption of a new county ordinance designed to complement the proposed lease. The first sale of leases is scheduled for May 1989.

Noranda trenching request. In December, Noranda Exploration, Inc., contacted the DNR regarding Noranda's interest in constructing several trenches (approximately 50 feet in length, 10 to 12 feet deep, and 3 to 4 feet wide) east of the City of Wausau in Marathon County. The trenches were to be constructed for purposes of sample collection and evaluation of metal content and were to be filled in and reclaimed within a period of a few weeks.

Because the word "trenching" is a part of the definition of prospecting (essentially, bulk sampling), staff of the DNR needed to decide whether or not the proposed activity was prospecting (to determine the "quality and quantity of metallic minerals") or for the more general purpose of exploration, which is defined as drilling activity for the "purpose of searching for metallic minerals or establishing the nature of known metallic mineral deposits." The environmental evaluation required for a prospecting proposal is significantly more involved and time consuming than that for exploration.

On the basis of information available to the DNR concerning the purpose of the activity, which was similar to exploration but did not involve actual drilling, DNR staff concluded that the trenching was "not regulated under (the) metallic mineral exploration or prospecting laws or regulations." The DNR informed Noranda of this conclusion on December 9, 1988. By the end of January 1989 the trenches had been constructed and sampled, and reclamation had begun.

Mineralco prospecting. Mineralco, Inc., submitted a prospecting permit application in 1987. The proposal called for extraction of about 4,000 tons of sand and gravel near Hixon Lake in Oneida County, in the northeast quarter of section 30, T36N, R9E. A public hearing was held on the proposed activity in January 1980. The DNR responded to the application in a letter (dated April 12, 1988), which outlined questions and concerns for which the DNR requested further information. No formal reply was received from the company during 1988, but informal communication indicates that the prospecting proposal was still under consideration by Mineralco.

Oil and gas

In July 1988 DNR staff met with officials of Amoco Production Company to discuss seismic investigations being conducted in Bayfield County. Seismograph Services Company used five truck-mounted vibrators along Highway 2 from the Douglas County line east through Iron River and Ino and into the vicinity of Moquah. In addition, four north-south traverses along that line of section were also completed. Exploratory drilling for oil and gas in Bayfield County is still possible, perhaps as early as 1989.

Mineral production

Preliminary information about the value of Wisconsin nonfuel mineral production in 1988 indicates that minerals worth more than \$231 million were produced--the highest level of mineral production, in terms of value, in the state's history. On the basis of figures from the U.S. Bureau of Mines, crushed stone production accounted for more than 46 percent of the state's total production value (\$107 million). Sand and gravel used for construction activities was the second leading mineral commodity (\$74 million), followed by lime (\$26 million), industrial sand (\$16 million), and dimension stone (\$6 million). Other mineral commodities produced in Wisconsin in 1988 included gem stones, peat, and natural abrasives.

MINERAL LEASING ACTIVITY IN 1988

Twenty-three counties in northern Wisconsin were surveyed by phone (10) or by review of mineral records in county register-of-deeds offices (13) to determine the extent of metallic mineral leasing activity in 1988. Since 1978 the recording of mineral transactions in register-of-deeds offices has been a requirement for metallic mineral development.

Three companies were active in acquiring metallic mineral leases in 1988: E.K. Lehmann and Associates of Wisconsin, Inc.; Noranda Exploration, Inc.; and Chevron Resources Company, Inc. A total of 7,137 new acres was leased during the year, including a 160-acre tract within the Chequamegon National Forest in Taylor County for which a prospecting permit (in federal terminology) was issued in May 1988. New leases were acquired in four counties: Marathon (Noranda), Lincoln (Lehmann), Rusk (Noranda, Lehmann), and Taylor (Lehmann, Chevron). Table 1 lists the totals of new acreage leased by county and company for 1988.

Table 1. New mineral acreage leased for metallic minerals, by county and company

County	Noranda Exploration	E.K. Lehmann and Associates	Chevron Resources	Total
Lincoln		470		470
Marathon	1,554			1,554
Rusk	1,183	2,981		4,164
Taylor		510	440	950
Total*	2,736	3,961	440	7,137

* Totals may not add up due to independent rounding to nearest whole acre.

All new metallic mineral acreage leased in 1988 meets the definition of target acreage, used informally to distinguish acreage leased for evaluation of specific anomalies versus acreage leased in large blocks for reasons apparently of convenience more than geologic necessity. Target acreage (Harkin and Davies, 1982) is defined to distinguish acreage in large (more than 1,000 acres) transactions versus average acquired in small (less than 1,000 acres) transactions. The assumption is that large transactions do not reflect any single target or anomaly of exploration interest, but are rather leases of convenience. Smaller transactions are assumed to reflect interest in specific targets or anomalies. Tables 2 and 3 provide an 11-year summary of new acreage leasing for metallic minerals. Tables 2 and 4 summarize oil and gas leasing activity since 1983.

Table 2. New mineral acreage contracted for leasing by year

Year	Metallic mineral transactions		Oil and gas transactions
	Total new acreage	Target acreage	Total acreage
1978	81,596	7,631	
1979	16,417	11,237	
1980	51,211	22,160	
1981	29,465	9,122	
1982	18,489	9,430	
1983	14,099	5,899	24,002
1984	3,136	3,136	196,408
1985	1,270	1,270	479,012
1986	1,566	1,566	19,335
1987	10,122	4,042	18,029
1988	7,137	7,137	0

Table 3. New acreage¹ of metallic mineral transactions contracted since 1978, by county

County	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	Total ¹
Barron	0	0	20	0	0	0	0	0	0	0	0	20
Chippewa	0	0	0	0	1,000	160	407	160	0	0	0	1,727
Clark	0	0	0	400	0	0	0	0	0	0	0	400
Florence	41,296	720	15,132	2,063	474	1,950	480	0	0	0	0	62,115
Forest	18,402	3,825	19,780	7,111	1,760	700	311	0	0	0	0	51,889
Iron	0	765	400	70	554	9,080	0	0	0	0	0	10,860
Jackson	0	0	0	0	565	0	0	0	0	0	0	565
Langlade	80	3,120	200	333	719	0	0	0	0	0	0	4,452
Lincoln	0	0	679	3,071	1,660	515	660	689	344	40	470	8,128
Marathon	80	80	1,597	848	240	200	0	0	783	370	1,554	5,752
Marinette	14,707	2,052	0	0	160	0	0	0	0	0	0	16,919
Oconto	0	680	0	0	0	0	0	0	0	0	0	680
Oneida	400	480	640	1,487	1,905	0	160	421	0	80	0	5,573
Portage	0	380	0	0	0	0	0	0	0	0	0	380
Price	5,945	2,265	8,586	12,603	7,740	800	840	0	10	917	0	39,706
Rusk	35	1,143	2,939	1,119	0	0	0	0	0	1,105	4,164	10,505
Sawyer	0	0	758	0	640	0	0	0	0	0	0	1,398
Taylor	200	566	480	360	1,077	627	278	0	429	7,610	950	12,577
Vilas	0	0	0	0	0	67	0	0	0	0	0	67
Waushara	451	350	0	0	0	0	0	0	0	0	0	801
Grand total ²	81,596	16,417	51,211	29,456	18,494	14,099	3,136	1,270	1,566	10,122	7,137	234,513

¹ Only new acreage leased is shown. Terminations of lease agreements are not included in table. Acreage totals do *not* indicate acreage currently under lease.

² Numbers in columns may not add up to grand total because of independent rounding of individual county totals.

Table 4. Oil and gas leasing in Wisconsin, in acres, 1983-88¹

County	Company ² (agent)								Total leased (dropped)
	Amoco (Beck, Perkins)	H & H Star Energy (Benchmark)	Texaco (Neece)	Chevron (Meany-Johnson)	Hunt Oil	Beard Oil	Conquest Exploration	T.O. Higgins	
Ashland (dropped)	29,325	6,954	1,196			740	1,243 (1,243)		39,458 (1,243)
Barron					3,696				3,696
Bayfield	153,335	9,225	14,683			4,021		601	181,865
Burnett		122,450 (800)			1,841		6,107 (6,107)		130,398 (6,907)
Douglas	1,397	290,080 (286,313)	7,433				4,448 (4,448)		303,358 (290,761)
Iron	845	1,540							2,385
Pierce		1,062	4,169	22,455			4,706 (4,706)		32,392 (4,706)
Polk		6,913			1,169	2,161	14,601		24,844
Sawyer		5,959					1,320 (1,320)		7,279
St. Croix			2,215				18,110 (18,110)		20,325
Washburn		2,218					6,568		8,786
Total leased (dropped)	184,902	446,401 (287,113)	29,696	22,455	6,706	6,922	57,103 (36,934)	601	754,786 (323,047)
Held as of 1/1/89	184,902	159,288	29,696	22,455	6,706	6,922	21,169	601	431,739

¹ Sources of information: Dickas (in press), Harkin (1984, 1985, 1986, 1988)

² Some operating oil companies acquire leases through land-acquisition agents who later assign (transfer) leases to the oil company.

Highlights of metallic mineral leasing in 1988

Although metallic mineral leasing activity was strong in 1988 compared to the previous six years, the leasing of more than 7,100 new acres was but one highlight of leasing activity. Also of major importance was the signing of a joint venture agreement between Noranda and a second company, affecting mineral holdings in Marathon County, and the expansion of mineral leasing in Rusk County.

In November 1988 Noranda Exploration, Inc., and another mineral company entered in an agreement whereby this second company would buy a 50 percent participating interest of mineral leases held by Noranda in the Town of Easton in Marathon County. In return, the second company would invest in the continuing evaluation of several prospects in this area, including primarily the "Reef prospect," named after Reef Exploration Co. Reef Exploration had previously assigned its mineral interests in this part of Marathon County to Noranda Exploration.

The leasing of more than 4,100 acres of mineral lands in Rusk County was another major feature of metallic mineral leasing activity in 1988. This leasing is south and east of Kennecott's mineral deposit near Ladysmith.

Terms of metallic mineral leases recorded in 1988 are structured primarily as option-to-purchase agreements. These mineral conveyances generally contain a purchase price for land, a rental fee to be paid annually until the purchase option is exercised, a retained-royalty clause, a bonus or signing payment, and amount of payments for any structural improvements made on the properties after the lease was signed.

Purchase prices ranged from \$1,000 to more than \$3,000 per acre (generally \$1,500 to \$2,000), rental fees (prior to exercising the purchase options) ranged from a low of \$5 per acre to as high as \$30 per acre. Generally, these fees increase annually over the term of the lease agreement. Many leases feature a retained-royalty clause, whereby the current landowner retains a 1 percent or, more commonly, a 2 percent "net return" royalty. A net return royalty is a payment obligation of the mine operator to the holder of the royalty interest; the royalty is based on a percentage of some mineral value, defined within the mineral lease, and payable when the mine is operating. A net return value is determined from the income generated by the sale of the contained metal, following the deduction of all allowable expenses. Some leases include a "lease back" clause allowing a landowner whose land has been purchased to lease back the property for a nominal fee (\$1) for a limited term (6 months to 1 year). In general, the term of these mineral conveyances ranged from a low of 2 years to the more common 5 years.

Leasing on federal lands

According to the Bureau of Land Management, U.S. Department of Interior, there were 30 active prospecting permits and 8 permits for federal land in Wisconsin as of January 1, 1989. In 1988 four new prospecting permit applications were received; three of these applications were withdrawn during the year. A total of 11,160 acres was under a prospecting permit in the Chequamegon National Forest (principally in Taylor and Ashland Counties) and 760 acres were under permit in Nicolet National Forest. In 1988 three exploratory drillholes were completed on federal minerals in the Chequamegon National Forest, Taylor County, by E.K. Lehman and Associates of Wisconsin, Inc., and Chevron Resources Company.

Oil and gas leasing

There was no new leasing activity related to oil and gas in Wisconsin in 1988. More than 420,000 acres in Wisconsin remain under lease for oil and gas. However, the multi-year agreement between Douglas County and H & H Star Energy about approximately 287,000 acres of county forest was terminated in August. Prior to termination, about \$700,000 had been paid to the county in rental fees, which were used to support a special fund for new business start-ups and business expansions in the Douglas County area. A total of 754,786 acres has been leased for oil and gas since the start of leasing in 1983. Following the termination of leases for 323,047 acres, 431,739 acres were held under lease for oil and gas as of January 1, 1989.

METALLIC MINERAL EXPLORATION ACTIVITY IN 1988

Metallic mineral exploration in Wisconsin in 1988 continued a trend of modest growth over previous years. A total of 48 drillholes was completed; 19 of these were considered development drilling (drilling for a known orebody). Total length drilled, in bedrock alone and bedrock plus overburden, increased about 15 percent from 1987 levels. The number of companies licensed to drill declined by one; five companies actually completed exploratory drillholes in 1988, compared to only three in 1987. Drilling occurred in four counties, an increase of one over the previous year.

The focus of metallic mineral exploration in Wisconsin is precious metals, primarily gold. The area around the Town of Easton near Wausau in Marathon County is the most active area for gold exploration, but other areas in Taylor and Rusk Counties have also been defined by the level and location of drilling activity over the last few years.

In 1988 Kennecott drilled 19 holes in their Flambeau copper massive-sulfide orebody south of the City of Ladysmith in Rusk County. This drilling, along with 9 drillholes completed in 1987, reportedly helped further define the ore reserve; a 27 percent increase in total reserves was identified. Current reserve estimate is 1.9 million tons.

Tables 5, 6, and 7 and figure 1 summarize the 1988 metallic mineral exploration situation; figure 2 illustrates the location of drilling activity in 1988 and during the previous 10 years.

Table 5. Five-year metallic mineral exploration summary

	1984	1985	1986	1987	1988
Companies licensed to drill ¹	18	16	11	10	9
Newly licensed companies ¹	3	1	2	1	1
Companies conducting drilling programs	8	5	4	3	5
Total counties with drilling activity	10	7	6	4	5
Total holes drilled	54	24	23	32	48
(development drilling) ²	(0)	(4)	(0)	(9)	(19)
Total footage drilled	16,664	19,444	15,480	20,220	23,577
(development drilling) ²	(0)	(4,753)	(0)	(2,324)	(2,258)
Total bedrock footage	13,573	15,944	13,390	17,710	19,697
(development drilling) ²	(0)	(4,343)	(0)	(338)	(1,239)

¹ An exploration license may be obtained at any time, but expires July 1st. This total includes companies licensed all or part of the indicated calendar year.

² Numbers in parentheses refer to development drilling (exploration drilling completed at sites of announced mineral deposits). Totals for development drilling are included in the totals not listed in parentheses.

Table 6. Metallic mineral exploration by company and county, 1988

Company [license number]	Drillholes	Bedrock footage	Total footage
Chevron Resources Co. [29]	13	12,152	13,904
E.K. Lehmann and Associates of Wisconsin, Inc. [5]	4	1,874	2,222
Kennecott Exploration (Australia), Ltd. [30]	19	1,239	2,258
Kerr-McGee Resources Corporation [17]	1	394	714
Noranda Exploration Inc. [3]	11	4,038	4,479
Total	48	19,697	23,577
County	Drillholes	Bedrock footage	Total footage
Iron	1	394	714
Lincoln	1	783	1,014
Marathon	11	4,038	4,479
Rusk	23	3,113	4,480
Taylor	12	11,369	12,890
Total	48	19,697	23,577

Table 7. Metallic mineral exploration licensees, 1988¹

License number	Company	License number	Company
1	Exxon Minerals Company	17	Kerr-McGee Resources Corporation
3	Noranda Exploration, Inc.	28	Utah International, Inc.
5	E.K. Lehmann and Associates of Wisconsin, Inc.	29	Chevron Resources Co.
9	American Copper and Nickel Co., Inc.	30	Kennecott Exploration (Australia), Ltd. ²
		31	Newmont Exploration Limited ³

¹ Companies listed were licensed to explore for metallic minerals in Wisconsin for all or part of 1988. License numbers not listed represent licenses issued previously to companies that did not renew their license for any part of the 1988 calendar year.

² This company did not renew its license for the July 1988 to June 1989 license year.

³ This company has not previously held a license to explore for metallic minerals in Wisconsin. Exploration licenses were first required in 1978.

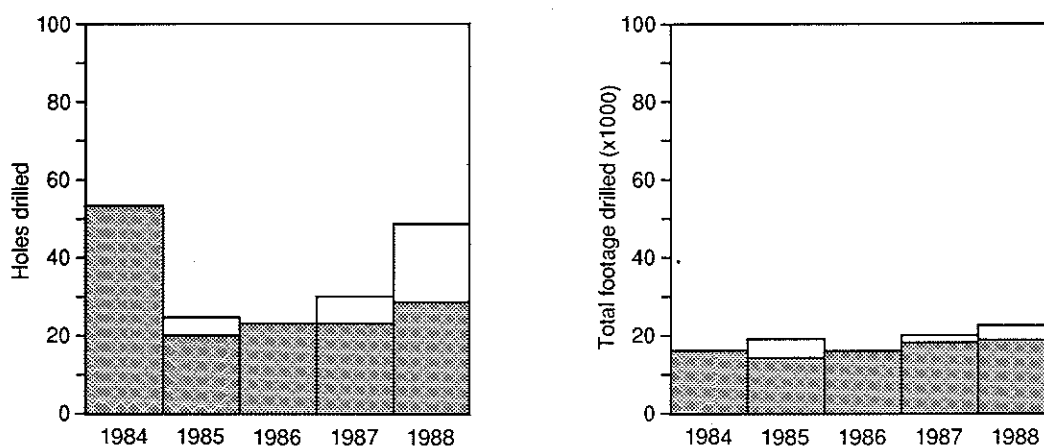


Figure 1. Exploration drilling in Wisconsin, 1984-88. Screened part of bar graph represents non-developmental exploration drilling. Nonscreened part represents development drilling on known mineral deposits.

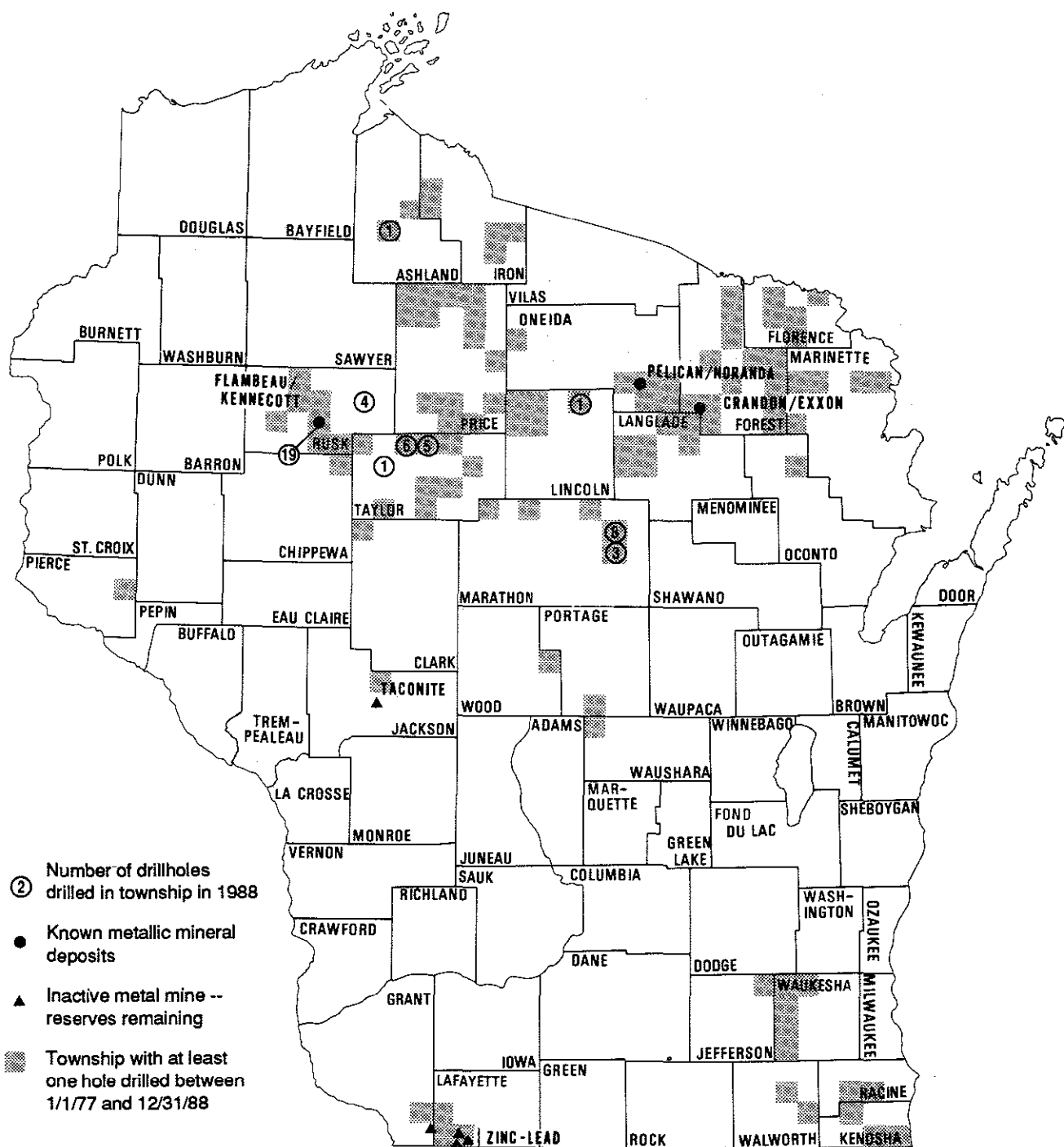


Figure 2. Metallic mineral exploration in Wisconsin, 1977-88. All drillhole data are from public records -- from drillhole abandonment reports submitted by metallic mineral exploration companies to the Wisconsin Department of Natural Resources.

REFERENCES

- Dickas, A.B., in press, Exploration for petroleum and natural gas along the Midcontinent Rift system of Wisconsin and the Lake Wisconsin region, 1983-1987: Wisconsin Geological and Natural History Survey Geoscience Wisconsin.
- Harkin, D.A., 1984, Mineral transactions activity and terms in Wisconsin - 1983: University of Wisconsin-Madison, Department of Agricultural Economics Staff Paper Series 218, 11 p.
- Harkin, D.A., 1985, Mineral transactions activity and terms in Wisconsin - 1984: University of Wisconsin-Madison, Department of Agricultural Economics Staff Paper Series 233, 9 p.
- Harkin, D.A., 1986, Mineral transactions activity and terms in Wisconsin - 1985: University of Wisconsin-Madison, Department of Agricultural Economics Staff Paper Series 252, 11 p.
- Harkin, D.A., 1988, Mineral transactions activity and terms in Wisconsin - 1986, 1987: University of Wisconsin-Madison, Department of Agricultural Economics Staff Paper Series 283, 11 p.
- Harkin, D.A., and Davies, T., 1982, Mineral transactions activity and terms in Wisconsin - 1981: University of Wisconsin-Madison, Department of Agricultural Economics Staff Paper Series 206, 11 p.



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