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**DIRECTORY OF INFORMATION
ON
CUYUNA RANGE
GEOLOGY AND MINING**



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ON
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GEOLOGY AND MINING**

By
R. J. Beltrame

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The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, creed, color, sex, national origin, or handicap.

INTRODUCTION

This directory is a revision of a portion of a final report prepared for the U.S. Bureau of Mines for grant #G0264002 entitled "Manganese-bearing ores of the Cuyuna iron range, east-central Minnesota, Phase 1". This work arose from the need for a compilation of basic geologic and mining information on the Cuyuna range.

This work is intended to compliment the "Selected bibliography of Cuyuna range geology, mining and metallurgy", Minnesota Geological Survey, Inf. Circ. 12, and "Manganese resources of the Cuyuna range, east-central Minnesota: a preliminary appraisal", Minnesota Geological Survey, Rep. Invest. 18 (in prep.).

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1. LOCATION OF PROPERTIES

Listings of property boundaries within the Cuyuna range are presented in Tables 1a and 1b. Table 1a is a description of detailed property boundaries listing the township, range, section(s) and the more detailed subdivision(s). These subdivisions were taken from Tretheway, W.D., 1974, Mining Directory Issue, Minnesota, 1974, Univ. of Minn. Bull. Tretheway's source of information for this mining directory was obtained from direct correspondence with the appropriate property owners. Data pertaining to the location of properties associated with The Hanna Mining Co., Pittsburgh Pacific Co., and U.S. Steel Corp. were taken from their respective ad valorem tax reports for 1976.

Many properties are described in part by government lot numbers due to the fact that otherwise regular quarter-quarter section plots are transected by water bodies. The government lot system has no regularity in its numbering scheme and for this reason the otherwise appropriate quarter-quarter section locations are given in parentheses.

Table 1a

Location of properties in the Cuyuna range

(listed by property name)

<u>Property</u>	<u>T</u> <u>R</u> <u>S</u>	<u>Subdivisions</u>
Adams Mine	46-28-30	SE $\frac{1}{4}$ -NW $\frac{1}{4}$, Lots 2(SW $\frac{1}{4}$ -NW $\frac{1}{4}$) & 3(NW $\frac{1}{4}$ -SW $\frac{1}{4}$)
Algoma Mine	47-29-33	NE $\frac{1}{4}$ -NW $\frac{1}{4}$
Alstead Mine	46-29- 9	SE $\frac{1}{4}$ -NW $\frac{1}{4}$, SW $\frac{1}{4}$ -NE $\frac{1}{4}$
Andrews	138-26-21	SE $\frac{1}{4}$ -NW $\frac{1}{4}$
Arko Mine	46-29- 9	Lot 1(NW $\frac{1}{4}$ -NE $\frac{1}{4}$, NE $\frac{1}{4}$ -NW $\frac{1}{4}$)
Armour No. 2 Mine	46-29-11	S $\frac{1}{2}$ -NW $\frac{1}{4}$, SW $\frac{1}{4}$ -NE $\frac{1}{4}$
Aune Reserve (H-40)	47-29-34	NW $\frac{1}{4}$ -SW $\frac{1}{4}$
Barrows Mine	44-31-10 11	N $\frac{1}{2}$ -SE $\frac{1}{4}$, SE $\frac{1}{4}$ -NE $\frac{1}{4}$ SW $\frac{1}{4}$ -NW $\frac{1}{4}$
Barrows Reserve (H-1)	44-31-15	N $\frac{1}{2}$ -NW $\frac{1}{4}$
Brainerd-Cuyuna Mine	45-31-36	E $\frac{1}{2}$ -SW $\frac{1}{4}$, part of NW $\frac{1}{4}$ -SE $\frac{1}{4}$ (west of N.P.R.R.)
Carlson-Nelson Mine	46-29-17	W $\frac{1}{2}$ -NW $\frac{1}{4}$, NW $\frac{1}{4}$ -SW $\frac{1}{4}$

<u>Property</u>	<u>T</u> <u>R</u> <u>S</u>	<u>Subdivisions</u>
Clearwater Lake Reserve (X-43)	45-28- 8 9	E½-SE¼ W½-SW¼
Crockett	138-26-20	SW¼-NE¼
Croft Diagonal Mine	46-29- 1	SE¼-SW¼, SE diag. ½ of SW¼-SW¼
Crosby Reserve (H-50)	46-29-18	Lot 1(NE¼-NE¼)
Crow Wing Reserve (O-11)	46-28-30	NE¼
Cuyuna Reserve (H-2)	45-30-21	SW¼-NE¼, NW¼-SE¼
Dunn Reserve (H-3)	45-30-14	S½-SW¼
Emily-Shawmut Reserve (P-27)	137-26-4 5	Lot 5 (SE¼-NW¼) SW¼-NE¼, Lots 2 (SE¼-NE¼), 1&4 (N½-NE¼)
Erich Reserve (X-60)	47-28-29	Lot 5(E½-SW¼)
Federal Reserve (X-37)	47-28-31	E½-NE¼
Feigh Mine	46-29-10	S½-NW¼, N½-SW¼
Ferro Mine	47-29-32	SE¼-NE¼
Gloria Mine	47-29-28	E½-SE¼, SE¼-NE¼
Gorman Mine	131-30-31	SE¼-SE¼
Gunderson Reserve (O-34)	45-29- 7	SE¼-SE¼
Hennen Reserve (H-49)	46-29-17	E½-NW¼, NE¼-SW¼
Hillcrest Mine - North	46-29- 9	E½-NE¼
Hillcrest Mine - South	46-29- 9	NE¼-SE¼, Lot 6(SE¼-SE¼)
Hopkins-Sultana Mine	46-29- 3	SE¼
Hunter Reserve (X-35)	47-29-22	SE¼-SW¼, SW¼-SE¼
Huntington Mine	46-29- 9	SW¼-SW¼, NE¼-SW¼ Lots 4(SE¼-SW¼) & 5(W½-SE¼)
Ironton Mine	46-29-11	NW¼-SW¼
Joan No. 1 Mine	46-29- 3	SW¼-NE¼
Joan No. 4 Mine	47-29-32	NE¼-SE¼

<u>Property</u>	<u>T</u> <u>R</u> <u>S</u>	<u>Subdivisions</u>
Kona Reserve (X-21)	47-28-31	SW $\frac{1}{4}$ -NE $\frac{1}{4}$
Kennedy Mine	47-28-29 30	Lot 6 (NW $\frac{1}{4}$ -SW $\frac{1}{4}$) N $\frac{1}{2}$ -SE $\frac{1}{4}$ -SE $\frac{1}{4}$
Louise Mine	46-29- 3	SE $\frac{1}{4}$ -SW $\frac{1}{4}$, Lot 7 (SW $\frac{1}{4}$ -SW $\frac{1}{4}$)
Mackey	138-26-21	N $\frac{1}{2}$ -SW $\frac{1}{4}$
Mahnomen Mine	46-29-10	N $\frac{1}{2}$ -NW $\frac{1}{4}$, NW $\frac{1}{4}$ -NE $\frac{1}{4}$
Mallen Mine	46-29-17	W $\frac{1}{2}$ -NE $\frac{1}{4}$
Mangan No. 1 Mine	46-29- 3	Lots 5 (S $\frac{1}{2}$ -NW $\frac{1}{4}$) & 6 (N $\frac{1}{2}$ -SW $\frac{1}{4}$)
Manuel Mine	46-29- 1	E $\frac{1}{2}$ -SE $\frac{1}{4}$
Maroco Mine	46-29- 4	SW $\frac{1}{4}$ -NW $\frac{1}{4}$, Lots 1 (NE $\frac{1}{4}$ -NE $\frac{1}{4}$), 2 (NW $\frac{1}{4}$ -NE $\frac{1}{4}$), 3 (NE $\frac{1}{4}$ -NW $\frac{1}{4}$), & 4 (NW $\frac{1}{4}$ -NW $\frac{1}{4}$)
Martin Mine	46-29-16	Lot 2 (N $\frac{1}{2}$ -NW $\frac{1}{4}$)
Mattson Rectangle Mine		
Armour No. 1	46-29-10	SE $\frac{1}{4}$ -NE $\frac{1}{4}$
Bonnie Belle	46-29-10	N $\frac{1}{2}$ -NE $\frac{1}{4}$ -SE $\frac{1}{4}$
Mangan No. 2	46-29-10	NE $\frac{1}{4}$ -NE $\frac{1}{4}$
Meacham East Mine	46-29-12	NW $\frac{1}{4}$ -NW $\frac{1}{4}$
Merritt No. 1 Mine	47-29-33	NW $\frac{1}{4}$ -SW $\frac{1}{4}$
Merritt No. 2 Mine	47-29-33	W $\frac{1}{2}$ -NW $\frac{1}{4}$
Milford Mine	47-29-23	SW $\frac{1}{4}$, SW $\frac{1}{4}$ -SE $\frac{1}{4}$
Minnesota Land and Colonization Reserve (H-41)	47-29-23	NE $\frac{1}{4}$ -SE $\frac{1}{4}$, Lot 4 (SE $\frac{1}{4}$ - NE $\frac{1}{4}$)
Musser Mine	47-29-33	E $\frac{1}{2}$ -SW $\frac{1}{4}$, NW $\frac{1}{4}$ -SE $\frac{1}{4}$
North Yawkey Mine	46-29- 1	SW $\frac{1}{4}$ -NE $\frac{1}{4}$, Lots 1 & 2 (N $\frac{1}{2}$ -NE $\frac{1}{4}$)
Northland Mine (N $\frac{1}{2}$ -NW)	47-28-20	N $\frac{1}{2}$ -NW $\frac{1}{4}$
Northland Mine (S $\frac{1}{2}$ -NE, S $\frac{1}{2}$ -NW)	47-28-20	S $\frac{1}{2}$ -NE $\frac{1}{4}$, S $\frac{1}{2}$ -NW $\frac{1}{4}$ (except south 912' of SW $\frac{1}{4}$ -NW $\frac{1}{4}$)

<u>Property</u>	<u>T</u> <u>R</u> <u>S</u>	<u>Subdivisions</u>
NWI Reserve (X-46)	45-29-10	SE $\frac{1}{4}$ -NW $\frac{1}{4}$
NWI Reserve (X-47)	45-30-13	NE $\frac{1}{4}$ -NE $\frac{1}{4}$
NWI Reserve (X-48)	45-30-14	SE $\frac{1}{4}$
NWI Reserve (X-49)	45-30-33	NW $\frac{1}{4}$ -NE $\frac{1}{4}$
NWI Reserve (X-50)	45-30-33	NE $\frac{1}{4}$ -NW $\frac{1}{4}$
NWI Reserve (X-51)	44-31-22	SW $\frac{1}{4}$
NWI Reserve (X-52)	44-30- 6	S $\frac{1}{2}$ -SW $\frac{1}{4}$, NE $\frac{1}{4}$ -SW $\frac{1}{4}$
NWI Reserve (X-53)	45-29- 9	NE $\frac{1}{4}$ -SE $\frac{1}{4}$
Omaha Mine	45-30-13	W $\frac{1}{2}$ -NE $\frac{1}{4}$, E $\frac{1}{2}$ -NW $\frac{1}{4}$, NW $\frac{1}{4}$ -SW $\frac{1}{4}$, SW $\frac{1}{4}$ -NW $\frac{1}{4}$
Pennington Mine	46-29-10	NW $\frac{1}{4}$ -SE $\frac{1}{4}$, SW $\frac{1}{4}$ -NE $\frac{1}{4}$
Polk Reserve (X-58)	45-30-23	NW $\frac{1}{4}$ -NW $\frac{1}{4}$
Pontiac Mine	47-29-34	S $\frac{1}{2}$ -NE $\frac{1}{4}$, SE $\frac{1}{4}$ -NW $\frac{1}{4}$ NW $\frac{1}{4}$ -NE $\frac{1}{4}$, N $\frac{1}{2}$ -NW $\frac{1}{4}$, NE $\frac{1}{4}$ -SW $\frac{1}{4}$
Portsmouth Mine Group		
Chisholm-Williams	46-29-11	NW $\frac{1}{4}$ -NW $\frac{1}{4}$
Evergreen	46-29-11	NE $\frac{1}{4}$ -NW $\frac{1}{4}$
Healy	46-29-11	NW $\frac{1}{4}$ -NE $\frac{1}{4}$
Oberg	46-29- 2	SE $\frac{1}{4}$ -SW $\frac{1}{4}$
Portsmouth	46-29- 2	SE $\frac{1}{4}$ -SE $\frac{1}{4}$
Portsmouth Extension	46-29- 1	N $\frac{1}{2}$ -SW $\frac{1}{4}$, SE $\frac{1}{4}$ -NW $\frac{1}{4}$, NW $\frac{1}{2}$ -SW $\frac{1}{4}$ -SW $\frac{1}{4}$
Preston Reserve (I-1)	47-29-27	NW $\frac{1}{4}$ -NW $\frac{1}{4}$
Rabbit Lake Mine	47-28-20 29 30	parts underlying Rabbit Lake Lot 6 (lakebed), parts underlying Rabbit Lake parts underlying Rabbit Lake
Rice River Reserve (St-8)	47-26- 4	SE $\frac{1}{4}$, SE $\frac{1}{4}$ -SW $\frac{1}{4}$, Lots 11 (SE $\frac{1}{4}$ -NE $\frac{1}{4}$) & 12 (SW $\frac{1}{4}$ -NE $\frac{1}{4}$)

<u>Property</u>	<u>T</u> <u>R</u> <u>S</u>	<u>Subdivisions</u>
Robert Mine	47-28-30	NW¼-SE¼, Lot 5(NE¼-SE¼, SE¼-NE¼)
Rowe Mine	46-29-18	NE¼-SE¼, Lots 8(S½-NE¼) & 9(NW¼-SE¼)
Sagamore Mine	46-29-19	NE¼, NW¼, N½-SW¼, W½-SE¼, SE¼-SW¼
Section 6 Mine	46-29- 6	N½-SE¼
Sisters Mine	47-29-34	SW¼-NW¼
Snowshoe Mine	46-29-17	SW¼-SW¼
South Yawkey Mine	46-29- 1	SE¼-NE¼
Syracuse Mine	46-29-19	Lot 4(SW¼-SW¼)
Syracuse Reserve (St-4)	46-30-24	SE¼-SE¼
Tabert Reserve (H-24)	45-30-22	N½-NE¼
Trojan Mine	46-29- 5	SE¼-NE¼, Lot 1(NE¼-NE¼)
Virginia Mine	46-29- 4 5	Lot 7(NW¼-SW¼) NE¼-SE¼
Virginia Extension Mine	46-29- 4	Lot 6(NE¼-SW¼)
Walker Reserve (H-29)	45-29- 7	S½-SW¼, SW¼-SE¼
Wearne Mine	46-29- 2	SW¼-SE¼
West Airport Mine	46-29- 1	NW¼-SE¼
Whitmarsh Reserve (H-66)	47-29-27	NW¼-NE¼
Willcuts Reserve (H-47)	43-32- 1 12	S½-SE¼ N½-NE¼, E½-NW¼, W½-SW, SW¼-NE¼, NE¼-SW¼
Zeno Reserve	47-29-28	E½-SW¼, W½-SE¼

Approximate quarter-quarter section locations of government lots are given in parentheses.

Reserve property symbols correspond to those in Trethewey, W.D., 1974, Mining Directory Issue, Minnesota, 1974, Univ. of Minn. Bull., p. 8-9.

Table 1b

Location of properties in the Cuyuna range
(listed by township, range, section)

<u>T</u>	<u>R</u>	<u>S</u>	<u>Property</u>
43 - 32		1	Willcuts Reserve (H-47)
		12	Willcuts Reserve (H-47)
44 - 30		6	NWI Reserve (X-52)
44 - 31		10	Barrows Mine
		11	Barrows Mine
		15	Barrows Reserve (H-1)
		22	NWI Reserve (X-51)
45 - 28		8	Clearwater Lake Reserve (X-43)
		9	Clearwater Lake Reserve (X-43)
45 - 29		7	Walker Reserve (H-29) Gunderson Reserve (O-34)
		9	NWI Reserve (X-53)
		10	NWI Reserve (X-46)
45 - 30		13	Omaha Mine NWI Reserve (X-47)
		14	NWI Reserve (X-48) Dunn Reserve (H-3)
		21	Cuyuna Reserve (H-2)
		22	Tabert Reserve (H-24)
		23	Polk Reserve (X-58)
		33	NWI Reserve (X-49)
		33	NWI Reserve (X-50)
45 - 31		36	Brainerd-Cuyuna Mine
46 - 28		30	Crow Wing Reserve (O-11)
			Adams Mine
46 - 29		1	North Yawkey Mine
			Manuel Mine
			Croft Diagonal Mine
			Portsmouth Mine Group
			South Yawkey Mine
			West Airport Mine
		SE $\frac{1}{4}$ -NW $\frac{1}{4}$	
		NE $\frac{1}{4}$ -SW $\frac{1}{4}$	
		2	Portsmouth Mine Group Wearne Mine
		3	Hopkins-Sultana Mine Mangan No. 1 Mine

<u>T</u>	<u>R</u>	<u>S</u>	<u>Property</u>
46 - 29		3	Louise Mine
			Joan No. 1 Mine
		4	Maroco Mine
			Virginia Mine
			Virginia Extension Mine
		5	Trojan Mine
			Virginia Mine
		6	Section 6 Mine
		9	Huntington Mine
			Hillcrest Mine-North
			Alstead Mine
			Hillcrest Mine-South
			Arko Mine
		10	Feigh Mine
			Mahnomen Mine
			Mattson Rectangle Mine
			Pennington Mine
		11	Portsmouth Mine Group
			Armour No. 2 Mine
			Iron-ton Mine
		12	Meacham-East Mine
		16	Martin Mine
		17	Carlson-Nelson Mine
			Mallen Mine
			Snowshoe Mine
			Hennen Reserve (H-49)
		18	Rowe Mine
			Crosby Reserve (H-50)
		19	Sagamore Mine
			Syracuse Mine
46 - 30		24	Syracuse Reserve (St-4)
47 - 26		4	Rice River Reserve (St-8)
47 - 28		20	Northland Mine (S½-NE, S½-NW)
			Northland Mine (N½-NW)
			Rabbit Lake Mine
		29	Rabbit Lake Mine
			Erich Reserve (X-60)
			Kennedy Mine
		30	Robert Mine
			Kennedy Mine
			Rabbit Lake Mine
		31	Federal Reserve (X-37)
			Kona Reserve (X-21)
47 - 29		22	Hunter Reserve (X-35)
		23	Milford Mine
			Minnesota Land and Colonization Reserve (H-41)
		27	Preston Reserve (I-1)
			Whitmarsh Reserve (H-66)

<u>T</u>	<u>R</u>	<u>S</u>	<u>Property</u>
47 - 29	28		Gloria Mine
			Zeno Reserve
	32		Ferro Mine
			Joan No. 4 Mine
	33		Musser Mine
			Merritt No. 2 Mine
			Algoma Mine
			Merritt No. 1 Mine
			NE $\frac{1}{4}$ -SE $\frac{1}{4}$
	34		Pontiac Mine
			Aune Reserve (H-40)
			Sisters Mine
	35		NW $\frac{1}{4}$ -NE $\frac{1}{4}$
131 - 30	31		Gorman Mine
137 - 26	4		Emily-Shawmut Reserve (P-27)
	5		Emily-Shawmut Reserve (P-27)
138 - 26	20		Crockett
	21		Andrews
			Mackey

Reserve property symbols correspond to those in Trethewey, W.D., 1974, Mining Directory Issue, Minnesota, 1974, Univ. of Minn. Bull., p. 8-9.

2. OWNERSHIP OF PROPERTIES

Table 2 is an alphabetical list of properties in the Cuyuna range showing the associated fee owner, lessee, and agent. Former property names are listed in parentheses below the corresponding property and are also cross-referenced. Reserve property symbols correspond to those in Tretheway, W.D., 1974, Mining Directory Issue, Minnesota, 1974, Univ. of Minn. Bull., p. 8-9. (E) indicates that property is exhausted of iron ore reserves.

Fee owners, lessees, and agents were compiled from listing in the 1974 Mining Directory and modified using data from the Mineral Resources Research Center, University of Minnesota. Data pertaining to properties associated with The Hanna Mining Co., Pittsburgh Pacific Co., and U.S. Steel Corp. were taken from their respective ad valorem tax reports for 1976.

Table 2

Ownership of properties in the Cuyuna range

<u>Property</u>	<u>Fee Owner</u>	<u>Lessee</u>	<u>Agent</u>
10 Adams Mine	U.S. Steel Corp.		
Algoma Mine (Hoch) (Iron Mountain)	Graham-Garbett Co. (3/4) & The Silloway Corp. (1/4)	Pittsburgh Pacific Co.	The Hanna Mining Co.
Alstead Mine (North Hillcrest)	Pittsburgh Pacific Co.		
Andrews	Lee W. Andrews	U.S. Steel Corp.	
Arko Mine	Pittsburgh Pacific Co.		
Armour No. 1 Mine (see Mattson Rectangle)			
Armour No. 2 Mine (E)	Inland Steel Co.		
Aune Reserve (H-40) (E)	J.C. Campbell, Jr., et al.		

<u>Property</u>	<u>Fee Owner</u>	<u>Lessee</u>	<u>Agent</u>
Barrows Mine	Hanna Iron Ore Div.		The Hanna Mining Co.
Barrows Reserve (H-1)	Hanna Iron Ore Div.		The Hanna Mining Co.
Bonnie Bell Mine (Liberty) (see Mattson Rectangle)			
Brainerd-Cuyuna Mine	City of Brainerd, D.R. Madison, et al.		
Carlson-Nelson Mine	Meyers Iron Co., G.M. Carlson, et al., Northern City National Bank, Duluth, Trustee, et al.		
≡ Chisholm-Williams Mine (see Portsmouth)			
Clark Mine (Trommald Village) (see Pontiac)			
Clearwater Lake Reserve (X-43) (Duggan)	Bergman, Knutsen, Street, and Ulman, (Trustee), Presbyterian Synod of Lakes and Prairies, et al.		
Crockett	Frank W. Crockett, et al.	U.S. Steel Corp.	
Croft Diagonal Mine (SE $\frac{1}{2}$ -SW $\frac{1}{4}$ -SW $\frac{1}{4}$) (SE $\frac{1}{4}$ -SW $\frac{1}{4}$)	The Hanna Mining Co. Allen Anderson, et al.	Allen Anderson, et al.	The Hanna Mining Co.
Crosby Reserve (H-50)	Hanna Iron Ore Div. (5/8) & Crosby Iron Co.		The Hanna Mining Co.

<u>Property</u>	<u>Fee Owner</u>	<u>Lessee</u>	<u>Agent</u>
Crow Wing Reserve (O-11)	U.S. Steel Corp.		
Cuyuna-Duluth Mine (see Ironton)			
Cuyuna-Mille Lacs Mine (see Louise)			
Cuyuna Reserve (H-2)	Hanna Iron Ore Div. (22.5%)		The Hanna Mining Co.
Cuyuna-Sultana Mine (see Mahnomen)			
Donahue Mine (see Gloria)			
12 Duggan Mine (see Clearwater Lake Reserve)			
Duluth-Brainerd Mine (see Ferro)			
Dunn Reserve (H-3)	Hanna Iron Ore Div.		The Hanna Mining Co.
Emily-Shawmut Reserve (P-27)	Shawmut Co., et al.	Syracuse Mining Co.	Pickands Mather & Co.
Erich Reserve (X-60)	George H. Crosby Estate, Northern City Nat'l. Bank, Duluth (Trustee), The Hanna Mining Co. (7/240), et al.		The Hanna Mining Co.
Evergreen Mine (see Portsmouth)			
Federal Reserve (X-37)	Federal Mining Co.		

<u>Property</u>	<u>Fee Owner</u>	<u>Lessee</u>	<u>Agent</u>
Feigh Mine (E)	Feigh Estate, Adams Bros. Co., et al.		
Ferro Mine (Duluth-Brainerd)	The Silloway Corp.	The Hanna Mining Co.	The Hanna Mining Co.
Gloria Mine (Donahue) (McKenzie)	Hanna Iron Ore Div. (3/5) & The Hanna Mining Co. (2/5)	Pittsburgh Pacific Co.	The Hanna Mining Co.
Gorman Mine (E)	Lydia M. Gorman		
Gunderson Reserve (O-34)	U.S. Steel Corp.		
Healy Mine (see Portsmouth)			
Hennen Reserve (H-49) (E)	The Hanna Mining Co.		The Hanna Mining Co.
Hillcrest Mine - North	Feigh Estate, Adams Bros. Co., et al.	R.M. Adams Estate, et al.	
Hillcrest Mine - South (E)	Feigh Estate, Adams Bros. Co., et al.	R.M. Adams Estate, et al.	
Hoch Mine (see Algoma)			
Hopkins-Sultana Mine (Mahnommen No. 4)	John Hopkins Trust Pittsburgh Pacific Co. (1/5), et al.		
Hunter Reserve (X-35)	Louise Hunter		
Huntington Mine	The Shawmut Co., et al.		
Ida Mae Mine (see Milford)			
Ironton Mine (Cuyuna-Duluth)	H. Burns, et al.		

<u>Property</u>	<u>Fee Owner</u>	<u>Lessee</u>	<u>Agent</u>
Iron Mountain Mine (see Algoma)			
Joan No. 1 Mine (E)	Jessee L. Swanson, et al.		
Joan No. 3 Mine (see Pontiac)			
Joan No. 4 Mine (E)	The Hanna Mining Co.		The Hanna Mining Co.
Kona Reserve (X-21)	City of Cuyuna		
Kennedy Mine (E) (part, see Robert)	Northern City Nat'l. Bank, Duluth, Trustee		
Liberty Mine (see Bonnie Bell)			
71 Louise Mine (Cuyuna-Mille Lacs)	Robert M. Adams Estate	Pittsburgh Pacific Co.	
Mackey	Ethel K. Mackey, et al.	U.S. Steel Corp.	
Mahnomen Mine (Cuyuna-Sultana) (Sultana)	Wm. C. Robinson, et al.	Harrison Inc., H.H. Harrison, Pres.	
Mahnomen No. 4 Mine (see Hopkins-Sultana)			
Mallen Mine	The Hanna Mining Co.		The Hanna Mining Co.
Mangan No. 1 Mine (E)	R.M. Adams Estate, et al.	Pittsburgh Pacific Co., (95.8%)	
Mangan No. 2 Mine (see Mattson Rectangle)			

<u>Property</u>	<u>Fee Owner</u>	<u>Lessee</u>	<u>Agent</u>
Manuel Mine	Northern City Nat'l. Bank, Duluth, (Trustee) & Thorpe Bros.		
Maroco Mine (E) (Lots 1&2)	Onondaga Iron Co.	The Hanna Mining Co.	The Hanna Mining Co.
Martin Mine	State of Minn.		
Mattson Rectangle Mine Armour No. 1 Bonnie Belle (Liberty) Mangan No. 2	State of Minn. State of Minn. State of Minn.		
McKenzie Mine (see Gloria)			
15 Meacham - East Mine	The Hanna Mining Co.		The Hanna Mining Co.
Merritt No. 1 Mine	The Hanna Mining Co.		The Hanna Mining Co.
Merritt No. 2 Mine	Graham-Garbett Co. (3/4) & The Silloway Corp. (1/4)	Hanna Iron Ore Div. (3/5) & The Hanna Mining Co. (2/5)	The Hanna Mining Co.
Milford Mine (Ida Mae)	Northern City Nat'l. Bank, Duluth (Trustee), B.R. Hassman Estate, Pittsburgh Pacific Co. (1/8), et al.		
Minnesota Land and Colonization Reserve (H-41)	The Hanna Mining Co.		The Hanna Mining Co.
Musser Mine (E)	The Hanna Mining Co.		
North Hillcrest Mine (see Alstead)			

<u>Property</u>	<u>Fee Owner</u>	<u>Lessee</u>	<u>Agent</u>
North Yawkey Mine (E)	Univ. of Minn.		
Northland Mine (N½ - NW)	State of Minn.		
Northland Mine (E) (S½ - NE, S½ - NW)	Chas. W. Potts, et al.	The Hanna Mining Co.	The Hanna Mining Co.
NWI Reserve (X-46)	Glacier Park Co.		
NWI Reserve (X-47)	Glacier Park Co. (1/2) & U.S. Steel Corp. (1/2)		
NWI Reserve (X-48)	Burlington Northern Inc.		
NWI Reserve (X-49)	Burlington Northern Inc.		
NWI Reserve (X-50)	Glacier Park Co.		
NWI Reserve (X-51)	Glacier Park Co.		
NWI Reserve (X-52)	Glacier Park Co.		
NWI Reserve (X-53)	Burlington Northern Inc.		
Oberg Mine (see Portsmouth)			
Omaha Mine (Wilcox) (E½-NW¼)	Hanna Iron Ore Div. (3/4), U.S. Steel Corp.		The Hanna Mining Co.
(SW¼-NW¼, NW¼-SW¼)	Hanna Iron Ore Div. (19/20)		The Hanna Mining Co.
Pennington Mine	The Shawmut Co., et al.		
Polk Reserve (X-58)	Univ. of Minn., et al.		

<u>Property</u>	<u>Fee Owner</u>	<u>Lessee</u>	<u>Agent</u>
Pontiac Mine (Clark, Trommald Village) (Joan No. 3) S½-NE¼, NW¼-NE¼, N½-NW¼, SE¼-NW¼ NE¼-SW¼	The Hanna Mining Co. R.H. Neimeyer, et al.	Hanna Iron Ore Div. (3/5) & The Hanna Mining Co. (2/5)	The Hanna Mining Co. The Hanna Mining Co.
Portsmouth Mine Group			
Chisholm-Williams	Hanna Iron Ore Div. (9/10) John P. Snyder & Mary Stuart Johnson (1/10)	Hanna Iron Ore Div.	The Hanna Mining Co. The Hanna Mining Co.
Evergreen	Hanna Iron Ore Div. (7/8) A.F. Pillsbury Estate (1/8)	Hanna Iron Ore Div.	The Hanna Mining Co. The Hanna Mining Co.
17 Healy	Hanna Iron Ore Div.		The Hanna Mining Co.
Oberg	Hanna Iron Ore Div.		The Hanna Mining Co.
Portsmouth	Hutchin's Iron and Ore Co., et al.	Hanna Iron Ore Div.	The Hanna Mining Co.
Portsmouth Extension	Hanna Iron Ore Div.		The Hanna Mining Co.
Preston Reserve (I-1)	Inland Steel Co.		
Rabbit Lake Mine	Northern City Nat'l Bank, Duluth (Trustee), et al.		
Rice River Reserve (St-8)	State of Minn.		
Robert Mine (E)	R.M. Adams Estate, et al.		
Rowe Mine (Lots 8&9) (NE¼-SE¼)	Cuyuna Iron Ore Co., Hanna Iron Ore Div.	Hanna Iron Ore Div.	The Hanna Mining Co. The Hanna Mining Co.

<u>Property</u>	<u>Fee Owner</u>	<u>Lessee</u>	<u>Agent</u>
Sagamore Mine	Chester A. Congdon, Pittsburgh Pacific Co. (9/32), et al.		
Section 6 Mine (E)	Crow Wing Iron Co.		
Sisters Mine	Benedictine Sisters Benevolent Assn.	Hanna Iron Ore Div. (3/5) & The Hanna Mining Co. (2/5)	The Hanna Mining Co.
Snowshoe Mine (E)	The Hanna Mining Co.		The Hanna Mining Co.
South Yawkey Mine (E)	Univ. of Minn.		
State Pit Mine (see Wearne)			
Sultana Mine (see Mahnomen)			
Syracuse Mine	J.J. Hennen Trust, et al.		
Syracuse Reserve (St-4)	State of Minn.		
Tabert Reserve (H-24)	Hanna Iron Ore Div.		The Hanna Mining Co.
Thompson Mine (see Portsmouth)			
Trojan Mine (E)	Chester A. Congdon, et al.		
Virginia Mine (E)	Chester A. Congdon, Adams Bros., et al.	Adams Bros. Co., et al.	
Virginia Extension Mine (E)	Adams Bros. Co.		
Walker Reserve (H-29)	Hanna Iron Ore Div.		The Hanna Mining Co.
Wearne Mine (E) (State Pit)	State of Minn.		

<u>Property</u>	<u>Fee Owner</u>	<u>Lessee</u>	<u>Agent</u>
West Airport Mine	Northern City Nat'l. Bank Duluth (Trustee), State of Minn., The Hanna Mining Co. (1/12), et al.	The Hanna Mining Co. (11/12)	The Hanna Mining Co.
Whitmarsh Reserve (H-66)	The Hanna Mining Co.		The Hanna Mining Co.
Wilcox Mine (see Omaha)			
Willcuts Reserve (H-47)	Hanna Iron Ore Div.		The Hanna Mining Co.
Zeno Reserve (NW $\frac{1}{4}$ -SE $\frac{1}{4}$, NE $\frac{1}{4}$ -SW $\frac{1}{4}$) (SW $\frac{1}{4}$ -SE $\frac{1}{4}$, SE $\frac{1}{4}$ -SW $\frac{1}{4}$)	Hanna Iron Ore Div. (2/3) Hanna Iron Ore Div.	Hanna Iron Ore Div. (1/3) Pittsburgh Pacific Co.	The Hanna Mining Co. The Hanna Mining Co.
T47N R29W Sec.33 NE $\frac{1}{4}$ -SE $\frac{1}{4}$	Unknown		
T47N R29W Sec.35 NW $\frac{1}{4}$ -NE $\frac{1}{4}$	Unknown		

(E) exhausted of iron ore reserves.

Reserve property symbols correspond to those in Trethewey, W.D., 1974, Mining Directory Issue, Minnesota, 1974, Univ. of Minn., Bull., p. 8-9.

3. MICROFILM DATA

The Minnesota Office of Ore Estimation (OOE) annually calculates iron ore reserve estimates for taxation purposes. These reserve estimates are based on drill hole assay data and geologic cross sections submitted by the respective property owners. Subsequent to these ore reserve estimates the OOE reproduces this geologic data on microfilm to facilitate storage and handling. This microfilm is available at the OOE, Eveleth, Minnesota. An index of this microfilmed data, arranged by properties, has been compiled by George Weaton and is presented in Table 3.

Table 3

Microfilm data of Cuyuna range properties-Index
(available at the Office of Ore Estimation, Eveleth, Minn.)

<u>Property</u>	<u>Roll No.</u>	<u>Frames</u>
Louise Mine	3	82-250
Mangan-Stai Mine	3	296-300
Merritt No. 1 & 2 Mines	3	252-290
Mallen Mine	4	570-590
Huntington Mine	5	446-510
Alstead Mine	19	547-596
Merritt No. 1 & 2 Mines	19	597-621
Alstead Mine	21	42-62
Merritt No. 1 & 2 Mines	21	0-9
Aune Reserve, Sisters 40 Reserve	21	205-250
Gloria Mine, Zeno Mine	21	103-204
Ferro Mine, Joan No. 4 Mine	21	10-41
Huntington Mine	21	251-325
Mallen Mine	21	334-352
Milford Mine	30	573-574
Manuel Mine, West Airport Mine	31	486-504
Manuel Mine, West Airport Mine	46	528-556
Clearwater Lake Reserve	46	60-678
South Carlson-Nelson Mine	47	39-60
Mangan No. 2 Mine	49	42-84
Mahnomen No. 1, 3 & 4 Mines	49	1-41
Mahnomen No. 1, 3 & 4 Mines	49	320-345
Sagamore Mine	49	620-678
Sagamore Mine	50	1-36
Mangan No. 2 Mine	54	28-54
Martin Mine	55	36-68
Huntington Mine	57	55-94
Mallen Mine	57	415-441
Northland Mine	57	37-54
Manuel Mine, West Airport Mine	59	435-462

<u>Property</u>	<u>Roll No.</u>	<u>Frames</u>
Whitmarsh Reserve	60	386-408
Hunter Reserve	60	386-408
Louise Mine	60	553-612
Merritt No. 1 & 2 Mines	60	501-552
Aune Reserve, Sisters 40 Reserve	61	288-325
Gloria Mine, Zeno Mine	61	435-474
Preston Reserve	64	307-320
Ferro Mine	64	237-251
Joan No. 4 Mine	64	237-251
Kona Reserve	64	252-271
Mangan No. 2 Mine	64	321-387
Huntington Mine	65	61-135
Joan No. 4 Mine	65	153-170
Rowe Mine	72	371-412
Manuel Mine, West Airport Mine	72	183-214
Mangan-Stai Mine	73	514-561
Merritt No. 1 & 2 Mines	73	338-384
Aune Reserve, Sisters 40 Reserve	74	22-69
Huntington Mine	74	163-277
Mallen Mine	74	278-297
Mahnomen No. 1, 3 & 4 Mines	78	75-154
Mangan No. 2 Mine	78	0-40
Sagamore Mine	78	217-272
Ironton Mine	80	414-463
Hunter Reserve	92	294-302
Northland Mine	92	371-388
Whitmarsh Reserve	92	271-298
Manuel Mine, West Airport Mine	95	520-534
Mahnomen No. 1, 3 & 4 Mines	96	354-402
South Carlson-Nelson Mine	96	122-144
Louise Mine	102	281-283
Adams Mine	126	381-426
Clearwater Lake Reserve	128	418-429
Clearwater Lake Reserve	128	443-447
Rowe Mine	128	451-496
Algoma Mine	135	305-363
Gloria Mine, Zeno Mine	135	305-341
Merritt No. 1 & 2 Mines	136	576-610
Louise Mine	137	358-446
Aune Reserve, Sisters 40 Reserve, Pontiac Mine	138	0-129
Algoma Mine	141	144-261
South Carlson-Nelson Mine	149	307-403
Sagamore Mine	152	291-548
Mangan No. 2 Mine	163	35-82
Aune Reserve, Sisters 40 Reserve, Pontiac Mine	164	593-599
Louise Mine	165	237-284
Clearwater Lake Reserve	176	209-223
Ferro Mine	176	618-624
Whitmarsh Reserve	176	625-632
Ferro Mine	177	616-end
Emily-Shawmut Reserve	177	336-362

<u>Property</u>	<u>Roll No.</u>	<u>Frames</u>
Alstead Mine	181	338-386
Clearwater Lake Reserve	181	507-537
Hennen Reserve	181	22-46
Hillcrest Extension Mine	181	367-386
Hillcrest Extension Mine	181	538-584
Joan No. 4 Mine	182	548-559
Arko Mine - see Alstead		
Hillcrest Mine, Hillcrest Extension - see Alstead		
North Hillcrest Mine - see Alstead		
Pontiac Mine - see Aune, Sisters 40		
South Alstead Mine - see Alstead		
South Yawkey Mine - see Manual, West Airport		
Zeno Mine - see Gloria		
Mangan No. 1 Mine - see Mangan-Stai		

EXHAUSTED PROPERTIES

<u>Property</u>	<u>Roll No.</u>	<u>Frames</u>
Section 6 Mine	2	316-330
	61	267-287
Trojan Mine	65	371-382
	80	445-455
	32	1-15
Virginia Mine	32	317-378
	46	557-619
	95	502-519
	2	192-220
Maroco Mine, Onondaga Mine	61	326-434
	65	171-194
	74	70-162
	48	630-651
Hopkins Mine	49	1-41
	96	246-265
	3	296-300
Joan No. 1 Mine	46	620-637
	59	463-475
North Yawkey Mine	2	465-530
Croft Mine	19	60-76
	19	103-118
	103	156-171
	103	196-213
	176	225-320
	64	252-271
Federal Reserve	176	331-360
	57	379-404
Snowshoe Mine	72	353-370
Crosby Reserve	60	258-271
Musser Mine	92	211-220

4. ABSTRACTS OF MINERAL REPORTS DATA

The Minnesota Office of Ore Estimation (OOE) annually calculates iron ore reserve estimates for taxation purposes based on drill hole assay data and geologic cross sections provided by the property owner. Abstracts of these estimates are bound into annual reports and are on file at the Minnesota OOE, Eveleth, and at the Minnesota Department of Revenue, St. Paul.

The data contained in these abstracts generally consist of one or more quantity estimates with an associated grade for each property or some fraction thereof. The assay data is recorded as weight percent of the ore or concentrate exclusive of any moisture present. Where additional information on the amount of water present is provided, the amount of natural iron and/or natural manganese is often also recorded. These estimates, although directed primarily towards iron ore reserves, do contain limited assay information on other elements, most notably manganese. However, in many cases manganese assay data are not available. Where they are available they are generally restricted to areas of definable iron ore reserves and thus the resource estimates that can be derived from these abstracts represent minimal values.

Annual volumes of Abstracts of Mineral Reports for properties within the Cuyuna range were obtained from the Minnesota Department of Revenue for the years 1957-1974. Available estimates are listed according to the property name in Table 4a with a chronological listing in Table 4b. There is an inconsistency between Tables 4a and 4b as follows: Table 4a is an index of estimates as they pertain to 1977 property boundaries, whereas Table 4b lists the property names as they appear in the abstracts. Because the property names and boundaries have changed over the years of these estimates, Table 4a is the more current source for property estimates.

Table 4a

ABSTRACTS OF MINERAL REPORTS-Index (Compiled from Office of Ore Estimation data)

(listed by property name)

<u>Property</u>	<u>Year of Estimate</u>	<u>Page</u>
Adams Mine	1958	295
Algoma Mine	1970	72
	1969	97
	1966	184-6
	1965	136
	1963	272
	1958	351

<u>Property</u>	<u>Year of Estimate</u>	<u>Page</u>
Alstead Mine	1967	139
	1962	205
	1961	263
	1960	246-7
Arko Mine	1967	137
	1962	204
	1960	245
Armour No. 2 Mine	1967	143-8
	1966	181
	1965	134
	1964	175
	1963	253-4
	1962	208-9
Aune Reserve (H-40)	1963	278
	1958	354
Barrows Mine	1965	142
	1958	377
Barrows Reserve (H-1)	1965	144
	1958	379
Brainerd-Cuyuna Mine	1974	113
	1966	188
Carlson-Nelson Mine	1968	140
	1962	215
	1958	340
	1957	202
Clearwater Lake Reserve (X-43)	1966	164
	1965	130
	1957	182
Colonization Reserve (H-41)	1963	264
	1958	342
Croft Mine	1967	133
	1964	161
	1962	191
	1958	317
Crosby Reserve (H-50)	1959	240-1
	1957	203
Crow Wing Reserve (O-11)	1958	292-3

<u>Property</u>	<u>Year of Estimate</u>	<u>Page</u>
Cuyuna Reserve (X-61)	1958	369
Dunn Reserve (H-3)	1958	365
Emily-Shawmut Reserve (P-27)	1964	154
	1962	187
	1956	228
	1956	230
Erich Reserve (X-60)	1966	165
	1958	303
Federal Reserve (X-37)	1958	306
Feigh Mine	1967	141
	1959	238
	1957	200
Ferro Mine	1963	270
	1958	348
Gloria Mine	1969	97
	1963	266
	1958	346
Gorman Mine	1950	176
Gunderson Reserve (O-34)	1958	310
Hennen Reserve (H-49)	1964	177
	1963	260
	1956	245
Hillcrest Mine-North	1967	135
	1963	247-9
	1960	244
	1960	248-9
Hillcrest Mine-South	1960	250
	1958	330
	1957	196
Hopkins-Sultana Mine	1968	138
	1966	176
	1963	242-3
	1963	245
	1962	195-8
	1961	261
	1960	238-40
	1957	189
1957	191	

<u>Property</u>	<u>Year of Estimate</u>	<u>Page</u>
Hunter Reserve (X-35)	1967	154
	1962	217
	1957	205
Huntington Mine	1964	171
	1963	251
	1960	252-3
	1959	236
	1957	194
Ironton Mine	1967	150
	1960	261
Joan No. 1 Mine	1949	101
Joan No. 4 Mine	1964	179
	1963	269
	1958	349
Kona Reserve (X-21)	1958	305
Kennedy Mine	1966	168-9
	1964	156
	1960	232-3
	1958	300
	1957	185
Louise Mine	1972	144
	1970	70
Mahnomen Mine	1965	138
	1963	242-3
	1962	196-7
	1962	211
	1962	220
	1960	239
	1960	255
	1958	332
	1957	191-2
	1957	198
	Mallen Mine	1963
1960		265
Mangan No. 1 Mine	1966	175
	1959	230
	1949	101
Manuel Mine	1970	68
	1960	235

<u>Property</u>	<u>Year of Estimate</u>	<u>Page</u>
Maroco Mine	1964	163
	1960	242
	1959	232
	1958	326
	1954	264
Martin Mine	1963	256
	1960	263
Mattson Rectangle Mine		
Armour No. 1	1958	334
Bonnie Belle	1962	207
Mangan No. 2	1958	332
Meacham Mine	1958	317-8
Merritt No. 1 Mine	1963	275
	1960	270
Merritt No. 2 Mine	1966	182
	1963	273
	1959	246
Milford Mine	1961	265
Musser Mine	1961	267
North Yawkey Mine	1956	234
	1954	178
Northland Mine (N½-NW)	1958	298
Northland Mine (S½-NE, S½-NW)	1962	189
	1958	298
NWI Reserve (X-46)	1958	314-5
NWI Reserve (X-47)	1958	359
NWI Reserve (X-48)	1958	367
NWI Reserve (X-49)	1967	158
	1958	374
NWI Reserve (X-50)	1967	159
	1958	375
NWI Reserve (X-51)	1965	146
	1958	381
NWI Reserve (X-52)	1967	156
	1958	357

<u>Property</u>	<u>Year of Estimate</u>	<u>Page</u>
NWI Reserve (X-53)	1958	312
Omaha Mine	1965	140
	1958	361
Pennington Mine	1964	173
	1962	213
	1960	256
Polk Reserve (X-58)	1958	372
Pontiac Mine	1970	74
	1963	278
	1958	354
Portsmouth Mine	1964	161
	1961	256-7
	1961	259
	1958	320
	1958	324
	1958	335
	1958	337-8
	1957	187
Preston Reserve (I-1)	1958	344
Rabbit Lake Mine	1969	93
	1968	136
	1966	168-71
	1964	156-7
	1963	240
	1961	253-4
	1960	232-3
	1958	300-1
	1957	184-5
Rice River Reserve (St-8)	1961	251
	1956	219
Robert Mine	1963	240
	1961	253-4
Rowe Mine	1963	262
	1959	243-4
Sagamore Mine	1967	152-3
	1960	267-8
Section 6 Mine	1958	328

<u>Property</u>	<u>Year of Estimate</u>	<u>Page</u>
Sisters 40 Reserve (H-67)	1970	76
	1963	278
	1958	354-5
Snowshoe Mine	1952	163
South Yawkey Mine	1964	159
Syracuse Mine	1948	101
Syracuse Reserve (St-4)	1948	101
Tabert Reserve (H-24)	1958	371
Trojan Mine	1966	179
	1964	169
	1962	202
	1959	234
Virginia Mine	1964	167
Virginia Extension Mine	1966	178
	1965	132
	1964	165
	1962	200
Walker Reserve (H-29)	1958	308
Wearne Mine	1958	322
West Airport Mine	1966	174
	1962	193
	1960	236
Whitmarsh Reserve (H-66)	1962	218
	1957	205-6
Willcuts Reserve (H-47)	1965	148
Zeno Mine	1969	97
	1966	182
	1963	267
	1958	346
T46N R29W Sec.1 SE¼-NW¼	1964	161
	1961	256-7
T46N R29W Sec.1 NE¼-SW¼	1964	161
	1961	256-7
T47N R29W Sec.33 NE¼-SE¼	1957	208

<u>Property</u>	<u>Year of Estimate</u>	<u>Page</u>
T47N R29W Sec.35 NW¼-NE¼	1964	181

Reserve property symbols correspond to those in Trethewey, W.D., 1974, Mining Directory Issue, Minnesota, 1974, Univ. of Minn. Bull., p. 8-9.

Table 4b

ABSTRACTS OF MINERAL REPORTS-Index
(compiled from Office of Ore Estimation data)

(listed by year of estimate)

<u>Year of Estimate</u>	<u>Property</u>	<u>Page</u>
1957	Clearwater Lake Reserve	182
	Robert (Kennedy)	184
	Adams	184
	Rabbit Lake (Lakebed)	184
	Portsmouth	187
	Hopkins-Sultana (Hopkins)	189
	Mahnomen No. 1	191
	Huntington	194
	South Hillcrest	196
	Mahnomen No. 3	198
	Feigh	200
	Carlson-Nelson (North)	202
	Crosby Reserve	203
	Hunter	205
	Whitmarsh	205
	T 47N R29W Sec. 33 NE¼-SE¼	208
1958	Crow Wing Reserve	292
	Adams	295
	Northland	298
	Rabbit Lake	300
	Rabbit Lake Lot. 5 (SE-SW) 47-28-29	303
	Kona Reserve	305
	Federal Reserve	306
	Walker Reserve	308
	Gunderson Reserve	310
	N.W.I. Reserve (X-53)	312
	N.W.I. Reserve (X-46)	314
	Croft	317
	Meacham (east)	317
	Portsmouth (Shenango Parcel)	320
	Wearne (Portsmouth)	322
	Portsmouth	324
	Maroco	326
	Section "6"	328
	South Hillcrest	330

<u>Year of Estimate</u>	<u>Property</u>	<u>Page</u>
1958	Mattson Rectangle (Mangan No. 2)	332
	Mattson Rectangle (Armour No. 1)	334
	Portsmouth (Healy 40)	335
	Portsmouth (Chisholm-Williams)	337
	Portsmouth (Evergreen)	338
	Carlson-Nelson (South)	340
	Colonization Reserve	342
	Preston Reserve	344
	Gloria	346
	Zeno	346
	Ferro	348
	Joan No. 4	349
	Algoma	351
	Pontiac	354
	Aune	354
	Sisters 40 Reserve	354-5
	N.W.I. Reserve (X-52)	357
	N.W.I. Reserve (X-47)	359
	Omaha	361-2
	Dunn Reserve	365
	N.W.I. Reserve (X-48)	367
	Cuyuna Reserve	369
	Tabert	371
	Polk Reserve	372
	N.W.I. Reserve (X-49)	374
	N.W.I. Reserve (X-50)	375
	Barrows	377
	Barrows Reserve	379
	N.W.I. Reserve (X-51)	381
	Brainerd-Cuyuna	383-4
	1959	Stai
Maroco		232
Trojan		234
Huntington		236
Feigh		238
Crosby Reserve		240
Rowe		243
Merritt No. 2		246
1960		Rabbit Lake
	Rabbit Lake (Lakebed)	232
	Manuel	235
	West Airport	236
	Mahnomen No. 4	238
	Mahnomen No. 1	239-40
	Maroco (Onondaga)	242
	Alstead (North Hillcrest)	244
	Arko	245
	Alstead	246-8
	North Hillcrest Extension	249

<u>Year of Estimate</u>	<u>Property</u>	<u>Page</u>
1960	South Hillcrest	250
	Huntington	252
	Mahnomen No. 3	255
	Pennington	256
	Armour No. 2	258-60
	Ironton	261
	Martin	263
	Mallen	265
	Sagamore	267-8
	Merritt No. 1	270
1961	Rice River Reserve	251
	Robert	253
	Rabbit Lake (Lakebed)	253
	T 46N R29W Sec. 1 SE ¼ - NW ¼	256-7
	Portsmouth	256-9
	Hopkins-Sultana (Hopkins)	261
	Alstead (South)	263
	Milford	265
	Musser	267
	1962	Emily-Shawmut (Wildcat)
Northland (South)		189
Croft		191
West Airport		193
Mahnomen No. 4		195
Mahnomen No. 1		196-8
Virginia Extension		200
Trojan		202
Arko		204
Alstead (South)		205
Mattson Rectangle (Bonnie Bell)		207
Armour No. 2		208-9
Mahnomen No. 3		211
Pennington		213
Carlson-Nelson (South)		215
Hunter		217
Whitmarsh	218	
Mahnomen Lean Ore Dump #16	220	
1963	Robert	240
	Rabbit Lake (Lakebed)	240
	Mahnomen No. 1	242
	Hopkins-Sultana (Hopkins)	245
	Arko (North Hillcrest)	247
	North Hillcrest	248
	Hillcrest Extension (North Hillcrest)	249
	Huntington	251
	Armour No. 2	253-4
	Martin	256
	Mallen	258

<u>Year of Estimate</u>	<u>Property</u>	<u>Page</u>
1963	Hennen Reserve	260
	Rowe	262
	Colonization Reserve	264
	Gloria	266
	Zeno	267
	Joan No. 4	269
	Ferro	270
	Algoma	272
	Merritt No. 2	273
	Merritt No. 1	275
	Pontiac	278
	Aune	278
	Sisters 40 Reserve (Sisters)	278
1964	Emily-Shawmut	154
	Rabbit Lake	156-7
	South Yawkey	159
	Portsmouth (Extension)	161
	Maroco (Onondaga)	163
	Virginia Extension	165
	Virginia	167
	Trojan	169
	Huntington	171
	Pennington	173
	Armour No. 2	175
	Hennen	177
	Joan No. 4	179
	T 47N R29W Sec.35 NW ¼ - NE ¼	181
	1965	Clearwater Lake Reserve
Virginia Extension		132
Armour No. 2		134
Algoma		136
Mahnomen Lean Ore Dump No. 16		138
Omaha		140
Barrows		142
Barrows Reserve		144
N.W.I. Reserve (X-51)		146
Willcuts Reserve		148
1966	Clearwater Lake Reserve (Duggan)	164
	Erich	165
	Rabbit Lake	168-71
	West Airport	174
	Mangan No. 1	175
	Hopkins-Sultana (Hopkins)	176
	Virginia Extension	178
	Trojan	179
	Armour No. 2	181
	Algoma	184-6
	Merritt	182

<u>Year of Estimate</u>	<u>Property</u>	<u>Page</u>
1966	Zeno	182
	Brainerd-Cuyuna	188
1967	Croft	133
	Hillcrest-North	135
	Arko	137
	Alstead	139
	Feigh	141
	Armour No. 2	143-8
	Ironton	150
	Sagamore	152-3
	Hunter	154
	N.W.I. Reserve (X-52)	156
	N.W.I. Reserve (X-49)	158
	N.W.I. Reserve (X-50)	159
	1968	Rabbit Lake (+ Lakebed)
Hopkins-Sultana (Sultana)		138
Carlson-Nelson (South)		140
1969	Rabbit Lake (Lakebed)	93
	Algoma	97
	Gloria	97
	Zeno	97
1970	Manuel	68
	Louise	70
	Algoma	72
	Pontiac	74
	Sisters 40 Reserve	76
1972	Louise	144
1974	Brainerd-Cuyuna	113

5. AVAILABILITY OF DRILL HOLE DATA

The most complete and consistent data set available for study consists of drill hole information compiled by the U.S. Bureau of Mines (USBM) between the late 1940's and early 1960's for their Minnesota Mineral Development Atlas (MMDA). The source of information for the MMDA was the drill hole data from the Minnesota Office of Ore Estimation that had been obtained from individual mining companies for purposes of taxation of iron ores mined in Minnesota. The USBM obtained permission from these mining companies to use the data in a confidential sense.

A compilation of data obtained from the U.S. Bureau of Mines MMDA project is shown in Table 5. This table is ordered by township-range-section. A section reference number established by the MMDA project is given with a county name (CW = Crow Wing, AK = Aitkin) followed by a 1 to 4 digit number designating a section (in some cases, two partial sections that are adjacent to each other will be given one section reference number). The number of drill hole logs available in each section is also given.

Section maps at a scale of 1:2400 (1" = 200') were available for the majority of sections with drill hole data and are indicated. These maps show section and quarter-quarter section (government lot) boundaries and, in some cases, outlines of excavated open pit operations as well as property boundaries. Drill hole locations are plotted with a corresponding arbitrarily designated serial number followed by the original drilling company hole number. In cases where extensive drilling has taken place, additional quarter-quarter section (government lot) maps at a scale of 1:600 (1" = 50') were provided. The number of these detailed maps for each section is given.

The availability of iron and manganese assay data in drilled iron-formation for each section is given. The only criterion is that at least one drill hole penetrates the main iron-formation.

The data compiled in the MMDA consist of 12,833 drill hole records, 125 full section drill plan maps at 1:2400, and 55 quarter-quarter section drill plan maps at 1:600.

Table 5

Availability of Cuyuna range drill hole data
(compiled from U.S. Bureau of Mines Minnesota Mineral Development Atlas)

<u>T</u>	<u>R</u>	<u>S</u>	U.S. Bureau of Mines Section Reference No.	Number of logs available	Drill Plan Maps		Availability of Assay Data in Drilled Iron-Formation		
					Full Section Map, 1:2400	¼-¼ Section Maps, 1:600	Fe+Mn	Fe,no Mn	No Fe or Mn
43-31-	6		C W 143	4	X			X	
43-32-	1		C W 142	4	X			X	
	12		C W 135	45	X			X	
44-30-	5		C W 304	6	X			X	
	6		C W 303	18	X			X	
44-31-	1		C W 302	9	X			X	
	2		C W 301	15	X			X	
	10		C W 291	61	X			X	
	12		C W 289	2	X				
	15		C W 250	21	X			X	
	16		C W 249	28	X			X	
	21		C W 241	13	X			X	
	22		C W 240	17	X				
	30		C W 196	18	X			X	
44-32-	36		C W 191	6	X			X	
45-28-	4		C W 467	7	X			X	
	8		C W 425	22	X			X	
	9		C W 424	12	X			X	
	18		C W 415	5	X			X	
45-29-	2		C W 463	40	X			X	
	3		C W 462	8	X				X
	7		C W 432	43	X			X	
	8		C W 431	23	X			X	
	9		C W 430	36	X			X	
	10		C W 429	10	X				X
	17		C W 410	6	X				X
	18		C W 409	20	X			X	

<u>T</u>	<u>R</u>	<u>S</u>	U.S. Bureau of Mines Section Reference No.	Number of logs available	Drill Plan Maps		Availability of Assay Data in Drilled Iron-Formation		
					Full Section Map, 1:2400	¼-¼ Section Maps, 1:600	Fe+Mn	Fe,no Mn	No Fe or Mn
45-30-	3		C W 456	13	X				
	9		C W 436	27	X				
	11		C W 434	2	X				
	12		C W 433	11	X				X
	13		C W 408	65	X		X		
	14		C W 407	53	X		X		
	20		C W 387	16	X				X
	21		C W 386	45	X		X		
	22		C W 385	12	X				X
	23		C W 384	4	X		X		
	27		C W 356	7	X		X		
	28		C W 355	20	X				X
	29		C W 354	3	X				X
	30		C W 353	19	X				X
	31		C W 338	8	X				X
	32		C W 337	18	X		X		
	33		C W 336	13	X				X
45-31-	36		C W 339	35	X				X
46-25-	3		A K 736	4					
	4		A K 735	28					
	14		A K 665	12					
	15		A K 664	21					
	20		A K 635	3					
	22		A K 633	2					
	28		A K 591	40					
	29		A K 590	2					
	30		A K 589	11			X		
46-27-	17		A K 650	1					
46-28-	2		C W 621	34	X		X		
	3		C W 620	21	X		X		
	6		C W 617	34	X				X
	9		C W 575	2	X				X
	10		C W 574	17	X				X
	11		C W 573	3	X				X
	16		C W 568	47	X		X		

<u>T</u>	<u>R</u>	<u>S</u>	U.S. Bureau of Mines Section Reference No.	Number of logs available	Drill Plan Maps		Availability of Assay Data in Drilled Iron-Formation		
					Full Section Map, 1:2400	¼-¼ Section Maps, 1:600	Fe+Mn	Fe,no Mn	No Fe or Mn
46-28-	20		C W 525	24	X			X	
	21		C W 524	30	X		X		
	29		C W 516	5	X			X	
	30		C W 515	83	X		X		
46-29-	1		C W 616	648	X	3	X		
	2		C W 615	553	X	4	X		
	3		C W 614	1227	X	6	X		
	4		C W 613	558	X	5	X		
	5		C W 612	264	X	1	X		
	6		C W 611	75	X		X		
	8		C W 582	56	X		X		
	9		C W 581	861	X	6	X		
	10		C W 580	1377	X	7	X		
	11		C W 579	799	X	3	X		
	12		C W 578	39	X		X		
	15		C W 563	11	X				
	16		C W 562	124	X	1	X		
	17		C W 561	542	X	5	X		
	18		C W 560	326	X	3	X		
	19		C W 532	775	X	6	X		
	20		C W 531	35	X				
	25		C W 514	34	X		X		
	26		C W 513	8	X				
	35		C W 478	21	X			X	
	36		C W 477	31	X		X		
46-30-	12		C W 584	38	X		X		
	13		C W 559	37	X		X		
	24		C W 533	60	X		X		
	26		C W 507	39	X				
	35		C W 484	30	X				
47-24-	6		A K 955	24			X		
47-25-	1		A K 954	8				X	

<u>T</u>	<u>R</u>	<u>S</u>	U.S. Bureau of Mines Section Reference No.	Number of logs available	Drill Plan Maps		Availability of Assay Data in Drilled Iron-Formation		
					Full Section Map, 1:2400	¼-¼ Section Maps, 1:600	Fe+Mn	Fe,no Mn	No Fe or Mn
47-26-	2		A K 947	9				X	
	3		A K 946	77				X	
	4		A K 945	63				X	
	17		A K 872	1					
	18		A K 871	2					
47-27-	29		A K 794	48				X	
	31		A K 792	4					
	32		A K 791	6					
47-28-	13		C W 725	3					
	17		C W 721	3					
	18		C W 720		X				
	19		C W 679	40	X				X
	20		C W 678	117	X			X	
	21		C W 677	44	X			X	
	22		C W 676	7	X				
	27		C W 671	2	X				
	28		C W 670	7	X				X
	29		C W 669	375	X	2		X	
	30		C W 668	240	X	1		X	
	31		C W 628	122	X			X	
	32		C W 627	30	X			X	
	33		C W 626	6	X				
47-29-	14		C W 716		X				
	15		C W 716	11	X			X	
	19		C W 685		X				
	20		C W 684	20	X			X	
	22		C W 682	123	X			X	
	23		C W 681	101	X			X	
	24		C W 680	60	X			X	
	25		C W 667	37	X			X	
	26		C W 666	30	X			X	
	27		C W 665	126	X			X	
	28		C W 664	99	X			X	
	29		C W 663	41	X			X	
	30		C W 662	89	X			X	

<u>T</u> <u>R</u> <u>S</u>	U.S. Bureau of Mines Section Reference No.	Number of logs available	<u>Drill Plan Maps</u>		<u>Availability of Assay Data in Drilled Iron-Formation</u>		
			<u>Full Section Map, 1:2400</u>	<u>¼-¼ Section Maps, 1:600</u>	<u>Fe+Mn</u>	<u>Fe,no Mn</u>	<u>No Fe or Mn</u>
47-29-31	C W 634	1					
32	C W 633	76	X		X		
33	C W 632	359	X	2	X		
34	C W 631	171	X		X		
35	C W 630	49	X		X		
36	C W 629	19	X			X	
47-30-25	C W 661	5	X				
48-25-22	A K 1061	12			X		
23	A K 1060	11			X		
30	A K 1017	4			X		
48-26-35	A K 998	44			X		
36	A K 997	51			X		
48-27-23	A K 1072	48	X		X		
27	A K 1008	9	X		X		
49-26-3	A K 1354	1					
5	A K 1352	2					
21	A K 1272	1					
50-25-6	A K 1561	1					
7	A K 1540	1					
8	A K 1539	1					
20	A K 1471	1					
50-26-15	A K 1490	1					
35	A K 1406	1			X		
50-27-23	A K 1480	1					
51-23-11	A K 1728	1					
23	A K 1660	1					
51-24-2	A K 1775	2					
11	A K 1734	1					
15	A K 1706	1					
23	A K 1666	1					
35	A K 1598	1					
51-26-35	A K 1610	1			X		
52-22-10	A K 1927	1					
52-23-13	A K 1918	1					
25	A K 1850	1					

<u>T</u>	<u>R</u>	<u>S</u>	U.S. Bureau of Mines Section <u>Reference No.</u>	Number of logs available	<u>Drill Plan Maps</u>		<u>Availability of Assay Data in Drilled Iron-Formation</u>		
					<u>Full Section Map, 1:2400</u>	<u>¼-¼ Section Maps, 1:600</u>	<u>Fe+Mn</u>	<u>Fe,no Mn</u>	<u>No Fe or Mn</u>
	52-25-	15	A K 1904	1					
		20	A K 1879	1					
	134-27-	3	C W 533		X				
	135-27-	2	C W 685		X				
		3	C W 686		X				
		4	C W 687		X				
	136-25-	1	C W 833	11	X		X		
		2	C W 834	1				X	
		3	C W 835	4			X		
	136-26-	4	C W 842	1	X				
		7	C W 821	1					
		17	C W 789	9	X			X	
		19	C W 766	2			X		
		23	C W 770	6			X		
		26	C W 731	2	X				
		30	C W 735	2					
		35	C W 720	5	X				
	136-27-	24	C W 765	1					
		27	C W 738		X				
		28	C W 739		X				
		29	C W 740		X				
		32	C W 709		X				
		33	C W 710		X				
		34	C W 711		X				
	137-25-	14	C W 942	1					
		20	C W 936	2					
		21	C W 937	8			X		
		24	C W 940	1					
		27	C W 889	14			X		
	137-26-	4	C W 1004	11			X		
	138-25-	11	C W 1155	2					
		12	C W 1156	1					
		22	C W 1100	2					
		24	C W 1102	1					
		26	C W 1050	1					

<u>T</u>	<u>R</u>	<u>S</u>	U.S. Bureau of Mines Section <u>Reference No.</u>	Number of logs available	<u>Drill Plan Maps</u>		<u>Availability of Assay Data in Drilled Iron-Formation</u>		
					<u>Full Section Map, 1:2400</u>	<u>¼-¼ Section Maps, 1:600</u>	<u>Fe+Mn</u>	<u>Fe,no Mn</u>	<u>No Fe or Mn</u>
138-25-	28		C W 1052	2					
	32		C W 1044	1					
138-26-	7		C W 1145	5					
	16		C W 1112	1					
	21		C W 1093	5					X
	23		C W 1095	6					X
	24		C W 1096	1					
	26		C W 1056	1					

6. AVAILABILITY OF DRILL CORE

In 1955 R.G. Schmidt of the U.S. Geological Survey compiled a "Master Catalog of Cuyuna District Drilling". Correspondence with mining companies, and federal and state agencies provided additions and deletions to Schmidt's original catalog. This revised edition is presented in Table 6.

This listing is ordered by owner of the drill core with the appropriate core storage location. For each storage location the list is arranged by Township, Range, and Section.

Table 6

Availability of Cuyuna range drill core
(listed by owner, and township, range, section)

Adams Bros. (Ironton, Minn.)

<u>T</u>	<u>R</u>	<u>S</u>	<u>Drill Hole No.</u>
46	- 29	- 4	Unit III, Unit IV
		5	33, 39-45
47	- 28	- 29	1-28, 150, 153, 156, 159, 162, 165, 168, 169A, 401-423, 714-717, 723-731, 755-792, 800, 1001- 1031, 2001-2030, 3001-3031
47	- 29	- 29	1-8, A-1 thru A-5

American Shield Corp. (Duluth, Minn.)

<u>T</u>	<u>R</u>	<u>S</u>	<u>Drill Hole No.</u>
46	- 30	- 24	S-1
47	- 28	- 20	N-1, N-2

Minnesota Department of Natural Resources (Hibbing, Minn.)

<u>T</u>	<u>R</u>	<u>S</u>	<u>Drill Hole No.</u>
46	- 29	- 3	S-24 thru S-46, 3, 11-13, 15-19
		5	39-45
		8	PL-1, PL-2

<u>T</u>	<u>R</u>	<u>S</u>	<u>Drill Hole No.</u>
46	- 29	- 9	1, JL-1 thru JL-6, 105-109, 800
		12	1
		16	S-1 thru S-20
46	- 30	- 24	1-6, S-1
47	- 28	- 31	8, 9, 25-31, 41-56, 101-112
47	- 29	- 33	101, 1001-1031, 2001-2030, 3001-3031
		34	435
		36	Z-1 thru Z-7, Z-9 thru Z-17

Minnesota Department of Natural Resources (St. Paul, Minn.)

<u>T</u>	<u>R</u>	<u>S</u>	<u>Drill Hole No.</u>
46	- 29	- 17	A, B, C, D

Hanna Mining Co. (Cooley, Minn. and Crosby, Minn.)

<u>T</u>	<u>R</u>	<u>S</u>	<u>Drill Hole No.</u>
43	- 31	- 6	203, 204,
		13	101-112, 117-119
		24	113-116, 121-123
43	- 32	- 1	101-104
		12	1-24, 108-122, 201-208
44	- 30	- 6	51-54
44	- 31	- 10	21-31
45	- 29	- 7	101-127
45	- 30	- 13	101-108, 201-218, 301-313
		21	201-208
46	- 28	- 33	D-601 thru D-610, D-208 thru D-210

<u>T</u>	<u>R</u>	<u>S</u>	<u>Drill Hole No.</u>
46	- 29	- 1	702, 703, 801-808, S-1 thru S-22, S-26 thru S-29
		2	H-701, H-702
		3	1-4, 14, 15, 17, 19-21, 24, 26, 29, 201-205, 225, 226, 228, 231, 300-321, 500-506, S-700 thru S-706, E-1000 thru E-1003, 1004-1006, S-1-55, S-2-55
		4	7-14, 303-309, 311, 313, 314, 802, 804-808, A-8, S-3 thru S-5, S-7 S-15 thru S-19, S-21, S-37 thru S-47, S-511, S-720, S-721, S-1-A, S-2-A, S-3-A, S-4-A, H-1 thru H-36, H-801 H-803
		5	S-1 thru S-12
		9	1-12, 215-237, 239-247, 264-277, 303-329, 341, 400-410, S-20, S-222 thru S-232, S-302 thru S-309, S-330 thru S-356, S-358, S-359, S-501 thru S-529, S-801 thru S-819
		10	804, 805, 809-832, 1000-1021, 1101-1104, D.D. 1044 thru D.D. 1048, E-1 thru E-4, E-6 thru E-9, S-1010, S-1022 thru S-1043
		17	300-307, 501-505, 507, 508, S-308 thru S-311
		18	3-12, 15-18, 20-31, 33-49, 51-74, 77-79, 100- 109, 111-117, 120-132, 136, 137, 139, 141, 143, 147, 149, 151, 153, 200-217, 500-575, 1006, 1010, A.H.10, A.H.21, A.H.27, A.H.30, A.H.33, A.H.35, A.H.38, A.H.42, A.H.43, A.H.46, A.H.58, A.H.61, A.H.64, A.H.65, A.H.68, A.H.70-A.H.79, A.H.107, A.H.108, A.H.110, A.H.114, A.H.115, A.H.117, A.H.123, A.H.129, A.H.141, A.H.143, A.H.144, A.H.145, A.H.149, S-801 thru S-856
		19	300-307
		25	5-7, 10, 13-19, 22, 23, 25, 28, 29, 32-36
		35	1, 8, 10, 15, 16
47	- 26	- 2	161, 246, 249, 276, 278, 283, 286, 288, 290, S-59, S-80, S-83, S-165, S-169
		3	156, 158, 160, 168, 172, 176, 177, 181, 182, 185, 186, 189-192, 195, 198, 203, 206, 210,

<u>I</u>	<u>R</u>	<u>S</u>	<u>Drill Hole No.</u>
47	-	26 - 3	215, 220, 223, 227, 231, 234, 237, 241, 242, 245, 250, 252, 253, 255, 256, 258, 260, 262, 265, 266, 270, 273, 281, 295, S-5, S-7, S-9, S-12, S-14, S-15, S-17, S-18, S-21 thru S-27, S-32, S-33, S-40, S-269
		4	40, 44-46, 52, 71, 88, 164, 167, 171, 174, 175, 180, 182, 184, 188, 194, 195, 197, 199, 202, 205, 224, 226, 229, 230, 235, 263, 267, 271, 275, 280, 282, 285, 291, 292, 295, S-1 thru S-6, S-8, S-10, S-11, S-13, S-15 thru S-21 S-29, S-30, S-35, S-38, S-39, S-41, S-42, S-45, S-47, S-49, S-51, S-54, S-57, S-64, S-68 thru S-70, S-76, S-79, S-82, S-87, S-90, S-91, S-94, S-96, S-97, S-99, S-100, S-101, S-104, S-105, S-107 thru S-110, S-112, S-114, S-116, S-117, S-119, S-120, S-124 thru S-126, S-129, S-130, S-132, S-134, S-135, S-138 thru S-140, S-144, S-147, S-148, S-152, S-200, S-293, S-299, S-300, S-309, S-313 thru S-334, S-346, S-349, S-354 thru S-356, S-359, S-369, S-372, S-374, S-377, S-1001, S-1006, S-1025, S-1036
		9	209, 214, 218, 219, 239
		17	208, 216, 225
		18	240, 247, 257
47	-	28 - 19	101-105
		20	100-108
		22	1, 2, 1000-1006
		30	1004-1010, 1113, 1114, 1030, S-1001 thru S-1003, S-1011, S-1012, S-1015 thru S-1029, S-1031 thru S-1035
		31	1-24, 30-35, 37-50, B-14 thru B-17, DDH-30, 1E thru 4E, SDH-1 thru SDH-4
47	-	29 - 6	S-200 thru S-256
		17	S-601 thru S-609
		22	65, 101, 102, 104, 301, 306, 308, BB1
		23	101-109
		27	51-53

<u>T</u>	<u>R</u>	<u>S</u>	<u>Drill Hole No.</u>
47	-	29 - 28	2201-2207, H-1 thru H-10, H-11 thru H-14, DD10
		30	S-201 thru S-212
		33	1-44, 54, 112, 113, 115-117, 120-123, 125-156, 212, 301-313, 315-319, 404-446, S-22 thru S-47, S-101 thru S-135
		34	201-211, 320, 326, 330, 334, 335, 338, 340, 342, 343, 346, 370-380, 401-447, D-501 thru D-504
		35	H-1 thru H-16
		36	101, (S)102, 103-106, S-107
48	-	25 - 30	300, 302, 304, 306, 307, 310-312
		31	222, 228, 232, 233, 236, 238, 243, 244, 248, 251, 254, 259, 261, 264, 268, 272, 274, 277, 279, 284, 287, 289, 294, 296
48	-	26 - 35	31, 36, 37, 43, 44, 46, 48, 52, 55, 60, 61, 63, 65-67, 72, 74, 292, 297, 298, 301, 303, 305, 308, S-28, S-34, S-58, S-73
		36	62, 75, 78, 81, 84-86, 89, 92, 93, 95, 97, 98, 102, 103, 106, 111, 113, 115, 118, 121-123, 127, 128, 131, 133, 136, 137, 141-143, 145, 146, 149-151, 154, 155, 157, 159, 162, 163, 166, 170, 173, 178, 179, 183, 187, 193, 196, 201, 204, 207, 211-213, 217, 221, S-77
48	-	27 - 23	S-100 thru S-104
49	-	26 - 5	1, 2
137	-	25 - 20	51, 52
		21	1-8
		27	101-114
Cole Lake			1-9
Hopkins			510, 512
Joan			S-707 thru S-719
Northern Pacific			2, D-17 thru D-24

<u>T</u>	<u>R</u>	<u>S</u>	<u>Drill Hole No.</u>
			Northland
			100-110, S-111
			Portsmouth
			S-300, S-313, S-331, S-346, S-349, S-354 - S-357, S-372, S-374, S-377, S-379, S-1001, S-1006, S-1025, S-1036, 275-281, S-100 thru S-109
			Shango Parcel
			408-411
			Stai
			S-720, S-721

Pittsburgh Pacific Co. (Crosby, Minn., and Hibbing, Minn.)

<u>T</u>	<u>R</u>	<u>S</u>	<u>Drill Hole No.</u>
46	- 29	- 1	Z-136, Z-142 thru Z-149, Z-326, Z-328
		3	7401-7403
		6	1, 2
		8	Z-12 thru Z-18, Z-23, Z-24
		9	Z-20 thru Z-22, Z-25 thru Z-30, ZJ-1 thru ZJ-19, ZJ-31 thru ZJ-38, 101-104, 106-111, 201, 202, 205-208, 210-221
		11	1-6
46	- 30	- 24	1-6
47	- 29	- 22	ZH-1 thru ZH-3, ZM-5
		25	Z-18
		26	ZM-3, ZM-4
		35	Z-1 thru Z-12
		36	101-103, Z-13, Z-13-A, Z-14

Snyder Mining Co. (Chisholm, Minnesota)

<u>T</u>	<u>R</u>	<u>S</u>	<u>Drill Hole No.</u>
46	- 29	- 16	S-1 thru S-20

U.S. Bureau of Mines (Fort Snelling, Minn.)

<u>T</u>	<u>R</u>	<u>S</u>	<u>Drill Hole No.</u>
46	- 25	- 14	1, 2
		15	1-10
		28	40
46	- 29	- 2	9, 10, 18, 19, 22, 29-31, 41-44, 55-58, 69, 70, 77, 91, 104-157, 159-162, 164, 165, 167, 168, 170-172, 174, 176-178, 180-184
		5	33-36, 38-46
		6	1, 3-11, 13, 14, 17-21, 23
		9	433, 434, 444, 446, 450, 451, 453, 455-459, 463-468, 470-475
		10	85, 86, 88, 90-92, 124-126, 132-135, 139-142, 353, 640-642
		11	20-30, 37-43, 47-60, 131-143, 145-151, 173-186, 188-203, 205, 206, 219, 220, 234
46	- 29	- 15	9-11
		16	80, 81, 82, 85-101, 103-112
		17	311
		18	41, 43, 123, 125, 130-137, 143, 144, 146, 148- 150, 152, 239-241, 166-172
46	- 30	- 11	1, 2
		13	34, 36, 37
		26	6-39
47	- 24	- 6	1, 3-11, 14
47	- 25	- 1	1-8
47	- 26	- 2	2, 4, 8
		3	21-29, 31-33, 36, 39, 41-76
		4	27-32, 34, 40, 44, 48, 50, 52, 53, 55, 58, 62, 64-71, 74-77, 79-94

<u>T</u>	<u>R</u>	<u>S</u>	<u>Drill Hole No.</u>
47	- 26	- 18	1
47	- 28	- 19	1, 3-5
		29	1-62, 106-211, 213-215, 218-225, 227-235, 237, 238
47	- 29	- 20	12-14
		22	97, 98, 117-119
		23	1-7, 9, 13, 15, 16, 19, 20, 26, 60, 61, 63, 65-71
		25	15-22
		26	13-17
		27	14, 15, 89-91, 94, 96-100, 110-118
		28	1-25, 83-86
		29	40,41
		30	86
		32	24, 25, 27-29, 60-63
47	- 29	- 34	123-129
		35	21-28, 44
48	- 26	- 35	21-44
		36	1-6, 12, 14-24, 27-31, 39-41, 43, 45-48, 50, 57
48	- 27	- 23	7-10, 41-48
49	- 26	- 3	1
		21	1
50	- 26	- 6	1
		7	1
		8	1
		10	1
		15	1

<u>T</u>	<u>R</u>	<u>S</u>	<u>Drill Hole No.</u>
50	- 26	- 20	1
		35	1
50	- 27	- 23	1
51	- 23	- 11	1
		23	1
51	- 24	- 2	1, 2
		11	1
		15	1
		23	1
		35	1
51	- 26	- 35	1
52	- 23	- 13	1
		25	1
136	- 24	- 1	1
136	- 26	- 4	1
		7	1
		19	1, 2
		26	1, 2
		30	1, 2
		35	1, 6
137	- 25	- 14	1
		24	1
138	- 25	- 12	1
		22	1, 2
		26	1
		28	1, 2

<u>T</u>	<u>R</u>	<u>S</u>	<u>Drill Hole No.</u>
138	- 25	- 32	1

U.S. Geological Survey (Beltsville, MD)

<u>T</u>	<u>R</u>	<u>S</u>	<u>Drill Hole No.</u>
46	- 29	- 1	9
		2	1-11
		3	1, 2, 118-132, 264
		4	2-4
		8	49480
		9	56-59, Union # 1, 3
		10	92-94, 109, 308, C
		12	30
		20	1-10
47	- 28	- 28	1, 4
		30	1-15
		31	1-25, 29-56, 101-112
		32	1-13, DDH 102
47	- 29	- 15	1-4
		20	1-6
		22	1-7, 101-104
		24	10, 11
		29	1-7
		30	1, 2, 101, 102
		32	1-4
		34	1-3
47	- 30	- 25	1-5

