Form 1

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DMEA~~XXX~~ Docket No. 2405

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MME Form 7
(10-58)

OFFICIAL FILE COPY

Date	Surname	Co
		2221

May 29, 1963

Memorandum

To: Director, Office of Minerals Exploration

From: F. M. Murphy, Mining Engineer
Division of Minerals

Subject: ARA Technical Assistance Proposal - Cuyuna Range Mineral Research

With reference to the report by the Director of the U. S. Bureau of Mines, which mentions (pages 2 and 3) that if the Applicant desires to explore its property for iron and manganese, the request should be made to OME, rather than ARA.

In February 1952, Adams Brothers Company of Duluth, Minnesota, submitted three applications to Defense Minerals Exploration Administration proposing exploration and metallurgical research on manganiferous materials. The applications, DMEA-2404-05-06, covered three sections of land on the Cuyuna Range.

In summary, the applications were denied because there was no economically feasible method whereby the iron and manganese could be extracted from the low grade material of the Cuyuna Range and, moreover, the proven and indicated reserves of this type of material on the Range were estimated at 500,000,000 tons.

In view of the estimated large reserves, this agency should not encourage the Cuyuna Range Minerals Research, Inc. to request further exploration in the area until such time as a feasible method has been found which would make such material exploitable on a commercial basis.

F. M. Murphy

F. M. Murphy

FMMurphy/mm
5/29/63
cc: DMEA-2404
DMEA-2405
DMEA-2406
Director's Reading File
Mr. Murphy

43683

400

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

~~WASHINGTON 25, D.C.~~
Region V
2908 Colfax Avenue South
Minneapolis 8, Minnesota

April 28, 1954

WSM

Memorandum

To: C. O. Mittendorf, Administrator, Defense Minerals Exploration Administration, Washington, D. C.

From: Executive Officer, Field Team, Region V

Subject: Dockets DMEA 2404-05-06 - Adams Brothers Company, Duluth, Minn.

In February 1952 we transmitted to you three exploration applications submitted to us from Adams Brothers Company, Duluth, Minnesota, proposing exploration and metallurgical research on manganiferous material from three sections of land on the Cuyuna Range of Minnesota.

After due consideration, the applications were denied contracts in May 1952, primarily because it was felt the project would disclose only "more of the same" tremendous measured, indicated and inferred low grade reserves.

In view of the increased interest in the DMEA program, the restoration of many commodities previously deleted from the list of eligible minerals, and the possibility of additional applications that might be forthcoming from the Cuyuna Range area, if favorable action could be established on one application, it is requested you reopen Dockets 2404-05-06 for reconsideration toward an exploration contract.

Although much has been discussed and written about huge resources of low-grade manganiferous material on the Cuyuna, tremendous tonnages of the whole are in the inferred classification. Again, and of greater import, is the lack of knowledge of tonnages that would disclose metallurgical response. As you are probably aware, in all classifications of ore on the Cuyuna there are gradations from high to low manganese, high to low silica, and high to low alumina. Also there are gradations of metallurgical response. Should one area produce material that is amenable to both beneficiation and subsequent metallurgical processes for recovery of manganese, it does not necessarily follow that another area along the same belt in the immediate vicinity would respond the same way. No one company would be justified in relying on so-called tremendous tonnages of an area to build a plant for manganese recovery without first determining the tonnage that would be metallurgically amenable. This Region of the Bureau of Mines has long contended

that extended exploration, combined with metallurgical testing, is most important before any answer leading to production is forthcoming. It was on this premise that Region V, in 1952, encouraged Adams Brothers Company to actively interest themselves in applying for a contract under the DMEA program.

We are not too sure Adams Brothers would still be receptive to a contract, should favorable reconsideration lead to one being drawn, but we do know of three other companies who would file an application in other areas of the Cuyuna Range.

Mr. M. E. Volin, Regional Director, Region V, plans to be in Washington probably the week of May 10, and will no doubt want to discuss with you the whole Cuyuna manganese exploration subject, so it would be greatly appreciated if you would review the subject docket situation preparatory to your meeting with him.

A. B. NEEDHAM

[redacted] Nov. 3 letter, received after this ~~reply~~ outgoing letter was done.

If you approve outgoing letter, Mr. Selfridge will acknowledge Nov. 3 letter, saying we have already written.

fw

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C.

Hold. Not used.

Mr. Clyde M. Pearce
Adams Brothers Company
12th Floor, Fidelity Building
Duluth, Minnesota

Re: Dockets Nos. DMEA 2404, 2405, 2406 - Manganese
SE¼, SW¼, Sec. 20, T. 47 N., R. 29 W.
NW¼, Sec. 29, T. 47 N., R. 29 W.
SE¼, NE¼, Sec. 30, T. 47 N., R. 29 W.
Crow Wing County, Minnesota

Dear Mr. Pearce:

This is with reference to a recent visit to this office by Mr. R. D. Reavill, an attorney associated with your company. He called on us to discuss the matter of manganese ore reserves on the Cuyuna Range in conjunction with our letter of May 15 and August 12, 1952, to you.

The discussion centered chiefly around the interpretation of ore reserves. Although we mentioned "known large refractory reserves" in our May letter, we did not use the word in the sense of proven ore reserves but as recognized reserves. While one might say that there are no proven manganese ore reserves on the Cuyuna Range, using the term in its strictest sense, it does not preclude the fact that it is generally recognized that tens of millions of low grade manganese-bearing material ~~is~~ are present on the range. tons of

For example: Drilling of 47 holes, aggregating approximately 17,000 feet, on a section in Aitken County in the same type of material you proposed to drill suggested in excess of 60,000,000 tons of measured and indicated low grade manganese-bearing rock and more could be inferred. The 200-ton pilot plant of which we wrote you will be supplied solely from dumps for the 8 years or so the contract is in force. Your own and adjoining drilling suggested that millions of tons of low grade material was available even though the drilling did not prove the deposit.

In our opinion, it is no longer a matter of indicating the presence of more of the low grade manganese material but determining

whether or not the manganese can be recovered from such material and still remain within the realm of economics. Manganese material, originating from the "Carbonate Slates", taken from the Sagamore mine did not lend itself to beneficiation. The preliminary beneficiation tests on core and sludge material taken from the Aitken drilling did not furnish a ferro-grade product because it was impossible to separate the manganese from the iron and silica to the degree necessary for such a product. Your own tests were disappointing, supposedly because the tested material consisted of churn drill cuttings. However, the inherent nature of the material may have been the more deciding factor.

Beneficiation tests to date suggest that concentrates made from the low grade manganese material will need further treatment by either a leaching or a duplex smelting process. The 200-ton "pilot" plant will furnish many answers relating to the feasibility of recovering manganese from the Cuyuna Range deposits. Possibly another chemical plant treating 12,000 or so tons daily of the "carbonate slate" type of ore may eventually become a reality if the operator can see his way clear economically. Until results of the chemical testing recently contracted for are available we regret that we must stand by our decision as set forth in our previous letters to you.

Sincerely yours,

Administrator

Administrator, DMEA

November 6, 1952

Iron and Ferro-Alloy Division, DMEA

Dockets Nos. DMEA 2404, 2405, 2406 - Manganese
Crow Wing County, Minnesota

Transmitted herewith are excerpts in part from a report on the Cuyuna Range by the Bureau of Mines.

G. C. Selfridge, Chief
Iron and Ferro-Alloy Division

Attachments

GCSelfridge'lm
11/6/52

cc: Admn. Reading File
Docket
G. C. Selfridge

400

NOV 14 1952

Mr. H. E. Heavill
Heavill, Jenswold, Neimeyer & Johnson
900 Alworth Building
Duluth 2, Minnesota

Re: Dockets Nos. DMSA 2404, 2405, 2406 -
Manganese
SW¼, SW¼, Sec. 20, T. 47 N., R. 29 W.
NW¼, Sec. 29, T. 47 N., R. 29 W.
NW¼, NW¼, Sec. 30, T. 47 N., R. 29 W.
Crow Wing County, Minnesota

Dear Mr. Heavill:

This is in response to your letter of November 3 referring to your visit here to discuss the above-referenced dockets.

Just prior to the receipt of your letter we had prepared a letter to Mr. Clyde M. Pearce as a result of your visit. The letter was based on a thorough review of all the data available to us here, a study of the economic side in the light of present information and on conferences with another Government agency which could and probably would be called upon to lend further aid in the development and production of the manganese. The letter is incorporated in this one.

During the meeting our discussion centered chiefly around the interpretation of ore reserves of the Cuyuna Range as now set forth in the literature and unpublished reports. Although we mentioned "known large refractory reserves" in our May letter, we did not use the word in the sense of proven ore reserves but as recognized reserves whose existence has been indicated and inferred by mine workings and drill holes to the extent that geologists were willing to commit themselves to certain reserve figures. While one might say with reservations that there are no proven manganese ore reserves on the Cuyuna Range, using the term in its strictest sense, it does not preclude the fact that it is generally recognized that tens of millions of tons of low grade manganese-bearing material are present on the Range.

For example: Drilling of 47 holes, aggregating approximately 17,000 feet, on a section in Aitkin County in the same type of material the Adams Company proposed to drill suggested in excess of 60,000,000 tons of measured and indicated low grade manganese-bearing rock and

more was inferred. The 200 ton pilot plant of which we wrote will be supplied solely from dumps for the 8 years or so that the contract will be in force. Former drilling on the subject sections suggested that millions of tons of low grade material were available even though the drilling did not prove the deposit. In summation, it would appear that there have been sufficient indications of the presence of large tonnages of low grade manganese-bearing material on the Range to interest private industry to further prove or disprove them when it feels that an economic method to recover the manganese is available.

In our opinion, it is no longer a matter of indicating the presence of more of the low grade manganese material but of determining whether or not the manganese can be recovered from such material and still remain within the realm of economics. A large sample of manganese material, originating from the "Carbonate Slates", taken from the Sagamore mine did not lend itself to beneficiation. The preliminary beneficiation tests on core and sludge material taken from the Aitken drilling did not furnish a ferro-grade product because it was impossible to separate the manganese from the iron and silica to the degree necessary for such a product. The tests on the Adams' drilling were disappointing, supposedly because the tested material consisted of churn drill cuttings. However, the inherent nature of the material may have been the more deciding factor.

Beneficiation tests to date suggest that concentrates made from low grade manganese-bearing material will need further treatment by either a leaching or a duplex smelting process. The 200 ton "pilot" plant now being constructed will furnish many answers relating to the feasibility of recovering manganese from the Cuyuna deposits. Possibly another chemical plant treating 12,000 or so tons daily of the "Carbonate Slate" type of mineralization may eventually become a reality if the operator, who has a chemical process, can see his way clear economically for production after taking into consideration the limits of aid that the Government might extend to him.

Until the results of the chemical testing recently contracted for are available this coming year, we regret that we must stand by our decision as set forth in our previous letters to the Adams Company. We also wish to assure you that the Government has not been lax in its interest in the Cuyuna manganese deposits as evidenced by the granting of the 200-ton "pilot" contract and its consideration of the possible larger plant.

Sincerely yours,

C. O. Mittendorf

Administrator

cc: Docket
Admn. Read. File
Field Team, Region V
G. C. Selfridge
N. B. Melcher, USBM
M. D. Crittenden, USGS

AUG 12 1952

Hon. Edward J. Thye
405 Federal Courts Building
St. Paul, Minnesota

Re: Redacts Nos. DMEA 2404, 2405, 2406 - Manganese
SE¼, NW¼, Sec. 28, T. 47 N., R. 29 W.
NW¼, Sec. 29, T. 47 N., R. 29 W.
SE¼, NE¼, Sec. 30, T. 47 N., R. 29 W.
Crow Wing County, Minnesota

My dear Senator Thye:

This is to acknowledge receipt of your letter of August 7, 1952, making inquiry regarding the denial of the three applications for exploration assistance which were submitted by Adams Brothers Company to explore for manganese in Crow Wing County, Minnesota.

No one doubts that there are large reserves of low grade manganese-bearing material on the Cuyuna Range. Sufficient tonnage of this type of material lies at or near the surface to satisfy the manganese consumption requirements of the United States for some years. Although a good deal of research work has been done, no economically feasible method has been discovered whereby this type of "ore" can be treated for the recovery of manganese. Data indicate that the production of manganese from the Range is dependent upon a feasible recovery method and not upon reserves. It does not appear logical to drill for low grade material, covered by an average of 170 feet of overburden as on the area under consideration, which cannot be treated when large tonnages of the same are more easily accessible at or near the surface.

I am enclosing herewith a copy of our letter to Mr. Clyde M. Pearce of Adams Brothers explaining in more detail the reasons for our denial of the Company's applications and a copy of DMEA Order-1 to which we refer.

If we can be of further assistance in this matter, please so inform us.

Sincerely yours,

C. O. Mittendorf

Acting Administrator

cc: Admn. Reading File
Docket
H. D. Melcher, USBM
H. D. Crittenden, USGS
Field Team Reg. V
G. C. Selfridge

Enclosure

GCSelfridge'lm
8/11/52

AUG 12 1952

Mr. Clyde M. Pearce
Adams Brothers Company
12th Floor, Fidelity Building
Duluth, Minnesota

re: Dockets Nos. [illegible] 2404, 2405, 2406 -
Manganese
[illegible], SW., Sec. 20, T. 47 N., R. 29 W.
[illegible], Sec. 29, T. 47 N., R. 29 W.
[illegible], [illegible], Sec. 30, T. 47 N., R. 29 W.
Cross Lake County, Minnesota

Dear Mr. Pearce:

This is in response to your letter of July 25, 1952, transmitting data relating to the manganese-bearing deposits of the Cuyuna Range and to the production and consumption of manganese in the United States upon which was based your request for reconsideration of the subject exploration applications which were denied earlier this year.

We have reviewed the three dockets together with the recently submitted information and other data available to us. Table No. 7 on page 8 of your report shows that the Cuyuna Range estimated reserve of all classes of "ore" totals 500,000,000 tons averaging approximately 5.0 percent manganese. Data available to us state that approximately 99,000,000 tons of the total reserve is considered as measured "ore" averaging 5.7 percent manganese. This reserve includes a goodly percentage of proven "ore" with the remainder considered as probable "ore". Thus, the measured reserve alone would be sufficient to supply the United States for the next 8 or 10 years at the present rate of consumption. Easily accessible ore included in the 500,000,000 ton figure runs into tens of millions of tons.

To date no one has been able to develop a satisfactory economical process to recover the manganese from the low grade "ores" of the Cuyuna Range. Until this is done it hardly appears logical to add to the measured and indicated reserves of the range by drilling indicated and inferred reserve areas when the manganese cannot now be recovered to aid the present war effort. It is our understanding that

such a 200 ton a day plant may be erected in Minnesota to treat the Cuyuna type "ore". This plant will test what seems to be the most feasible method to recover manganese that has been suggested by the experimental work done to date. If the work to be done at this test plant indicates that recovery of manganese from the Cuyuna "ores" is economically feasible, then the entire exploration and production picture will change.

For your information I am enclosing a copy of the Mineral Order DMEA Order-1 which outlines the procedures and regulations for obtaining exploration assistance. Please note in Section 2(a) that exploration shall not go beyond a reasonable delineation and sampling of the ore. Thus, DMEA could not participate in blocking out proven ore as suggested on page 17 of your report. Drilling under a DMEA program would contribute to the "possible" reserve category rather than the "proven" one. There are many relatively small manganese deposits in the United States from which saleable concentrates can be produced by rather simple beneficiation methods. These include both black oxide and carbonate deposits, the latter in the minority. Some are low grade approaching the 5.0 percent manganese value assigned to the Cuyuna "ores". By beneficiation they can be brought within the realm of economics which is not so for the Cuyuna "ores" and which will not be so until a reasonably overall manganese recovery process is evolved that can recover the manganese from the millions of tons of easily accessible manganese-bearing material now existent on the Range.

In summation, it is difficult to see how the proposed exploration will benefit the present National Defense Program by adding to or changing the reserve category of the already large manganese reserves of the Cuyuna which to date cannot be feasibly beneficiated. We regret, therefore, that our denial of May 15 must stand.

Sincerely yours,

C. O. Mittendorf

Acting Administrator

Enclosure

TLChapman-GCSelfridge:lm
8/12/52

cc: Admn. Reading File
Docket
W. B. Melcher, USBM
H. D. Crittenden, USGS
Field Team Reg. V
G. C. Selfridge
T. L. Chapman

400

Acting Administrator, DMEA

May 8, 1952

Iron and Ferro-Alloy Division, DMEA

Denial of exploration projects in the amount of $100,030.00
Dockets Nos. DMEA 2404, 2405, and 2406
Adams Brothers Company
SW¼, SW¼, Sec. 20, T. 47 N., R. 29 W.
NW¼ Sec. 29, T. 47 N., R. 29 W.
SW¼, NW¼, Sec. 30, T. 47 N., R. 29 W.
Crow Wing County, Minnesota

The denial of the subject applications by this Division is based on the following information:

(1) The measured, indicated and inferred reserves of manganiferous-bearing material of this district, containing approximately 5 percent manganese, amount to about 500 million tons (See Bureau of Mines' memorandum). The relatively small tonnage that would be added to the above reserves would be of no help to the present war effort.

(2) The metallurgical problems of these refractory ores have not been completely worked out up to the present time and until such a time as these problems have been satisfactorily completed, there is little use in adding to the present reserves.

(3) The "ores" in this area are covered by about 170 feet of overburden, which is frequently inundated by the floods of the Mississippi River. Hence mining would be a problem as stripping would necessitate the removal of about four tons of waste for each ton of "ore" mined. The pits would be wet and would possibly be flooded in flood seasons. Underground mining is not feasible for this grade of ore in this area.

George C. Selfridge

G. C. Selfridge, Chief
Iron and Ferro-Alloy Division

TLChapman:ls

Copy to: Admn. Reading File
Docket
G. C. Selfridge
T. L. Chapman
Operating Committee
M. D. Crittenden, USGS
N. B. Melcher, USBM

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO : Administrator, DMEA

DATE: November 6, 1952

FROM : Iron and Ferro-Alloy Division, DMEA

SUBJECT: Dockets Nos. DMEA 2404, 2405, 2406 - Manganese
Crow Wing County, Minnesota

Transmitted herewith are excerpts in part from a report on the Cuyuna Range by the Bureau of Mines.

G. C. Selfridge

G. C. Selfridge, Chief
Iron and Ferro-Alloy Division

Attachments

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO :

DATE: Oct. 21, 1952

FROM :

SUBJECT: Cuyuna Range

Frank F. Grout Article 1942. Manganese Samples of Carbonate Slates.

	1	2	3	4	5
Mn	4.14	7.90	9.10	1.76	2.24
Fe	26.55	25.86	22.31	28.06	27.59
SiO_2	26.20	28.14	34.92	30.15	40.70
CaO	1.92	1.34	1.12	1.25	1.28
MgO	4.92	2.05	2.72	4.77	2.77
P	.224	.193	.063	.290	.250

Frank F. Grout Letter of July 11, 1952.

"Drill records made in search for merchantable ore commonly stop when they reach the green slate, and such records are incomplete. As a consequence my estimate of the amount of formation carrying 5% manganese, ranges from 150 to 250 million tons, and I did not feel too confident of the result.

"It is true, however, that a large part of the approved 'engineers estimate" is classified as very uncertain. In the classification in three groups, 1 measured, 2 indicated, 3 inferred, much of the available information is inferred.

"At the Milford Mine and at the Pontiac mines the cores show considerable thickness of carbonate slate in continuous beds. Open pits show carbonate slate as much as 50 feet thick in the Arko, North Hillcrest, East Mahonomen and Sagamore Mines, without exposing the contacts with other beds above or below."

Grout proposes drilling in the following areas due to high magnetic anomalies:

Sec. 26, T. 137 N., R. 26 W., Crow Wing County
Sec. 5, T. 49 N., R. 26 W., Aitkin County
Sec. 12, T. 138 N., R. 25 W., Crow Wing County.

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO :

DATE: Oct. 22, 1952

FROM :

SUBJECT: Cuyuna Range

Open pit mining easily accessible:

Measured L.T.	%Mn.	Indicated L.T.	%Mn.	Inferred L. T.	%Mn.
21,500,000	6.9	13,000,000	3.0	7,000,000	5.0

Open pit mining, 50' to 80' overburden:

Indicated	Mn.	Inferred	Mn.
105,000,000	5.5	123,000,000	5.0

Oxidized slate, 150' to 250' overburden:

Measured L.T.	%Mn.	Indicated L.T.	%Mn.	Inferred L.T.	%Mn.
24,400,000	3.6	50,000,000	3.6	75,000,000	3.6

Churn drill holes by M. A. Hanna, Sec. 23: 37-S-100, 38-S-101, 39-S-102, 40-S-103, 41-S-104.

Battelle Institute tests from above holes: Ore, 4.6% Mn. by washing and gravity to 20.6%; 83% saving.

Bureau of Mines tests by washing and gravity concentration: 22.4% Fe, 24.55% Mn., 65.2% saving.

Sampling and testing shows that carbonate slate from operating mines was the same as slates from drilled area. Hence, a 70 ton car has been obtained from Sagamore mine.

Flotation tests produced - 10.01% Mn, 28.43% Fe.

Carl Wood considers that ultimately the ores will have to be handled by a leach process.

D.D. cores from Section 23.

Head 3.66% to 5.5% in screened samples.

Washing removed 36.7% material and 4.9% of manganese.

Product	Wt. %	Assay % Fe	Assay % Mn	Percent of Total Fe	Percent of Total Mn
-10 +36 mesh	18.1	17.40	12.94	27.3	64.1* - XX
-35 +100 mesh	2.7	18.92	14.01	4.4	10.3* - XX
-100 +200 mesh	2.0	12.08	8.29	2.9	4.6* - XX
-200 mesh	40.5	9.62	1.45	33.7	16.1 - XX
Slimes	36.7	10.02	.49	31.7	4.9
Composite	100.0	11.57	3.66	100.0	100.0

* 79% Mn. - Average, 12.7% Mn.

XX 95.1% Mn. - Average, 5.49% Mn.

Table concentrates of washed and deslimed sample ground to 35 mesh.

Product	Wt. %	Assay % Fe	Assay % Mn	Assay % SiO_2	Assay % P	Percent of Total Fe	Percent of Total Mn	Percent of Total SiO_2	Percent of Total P
Concentrate	8.8	22.40	24.55	13.98	0.106	16.9	65.2	2.6	28.3
Middling	6.2	16.50	6.81			8.7	12.7		
Tails	24.0	10.67	1.25			21.9	9.1		
Wash slimes	61.0	10.07	0.70			52.5	13.0		
Composite	100.0	11.69	3.31			100.0	100.0		

78% of Mn. contained in 15% of ore with an average of 17.2% Mn.

Humphrey Spiral -10 mesh.

Product	Wt. %	Assay % Fe	Assay % Mn	% of Total Fe	% of Total Mn
Concentrate	14.8	20.85	20.60	23.9	56.8
Tails (Sand)	17.4	13.98	6.62	18.9	21.4
Tails (Slime)	67.8	10.82	1.73	57.2	21.8
Composite	100.0	12.85	5.37	100.0	100.0

Sample of Section 23, Aitkin County, Minnesota, by washing and gravity.

Concentrate - 22.4% Fe, 24.55% Mn, 13.98% SiO_2, 0.106% P
Weight - 8.8%
Save - 16.9% Fe, 65.2% Mn, 2.6% SiO_2, 28.3% P.

Battelle Institute, M. A. Hanna holes, Section 23.

Heads - 4.57% Mn, 14.9% Fe.
Flowsheet - (1) blunging (2) desliming 200 mesh (3) heavy media concentrate (4) tabling sands.
83% Mn recovered, assaying 20.6% Mn.
90% Mn recovered, assaying 11.3% Mn.
Middlings and tails all retreated.

Ore from Sagamore Mine.

Desliming, table concentration, magnetic separation were tried and results were practically nil.

Roasting and magnetic tests showed increase in heads from 6.00% Mn to 8.5% Mn.

Flotation tests, Sagamore ore.

Product	Assay %		% of Total		Wt. %
	Mn	Fe	Mn	Fe	
Concentrate	10.01	28.43	68.6	52.2	50.8
Tails	4.75	36.96	31.4	47.8	49.2
Composite	7.42	27.74	100.0	100.0	100.0

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO :

DATE: Oct. 21, 1952

FROM :

SUBJECT: Cuyuna Range
Utah Construction Company
Section 23, T. 48 N., R. 27 W.

Data based on:

14,360 feet churn drill holes - 40 holes
2,583 feet diamond drill holes - 7 holes

Ore to average 3% Mn.

Above drilling was done by M. P. Botsford in 1913, the Crosby Exploration Company in 1917, the M. A. Hanna Company in 1947, and the U. S. Bureau of Mines in 1950. Average 3-3/4% Mn.

Measured - 37,800,000 long tons - 3-3/4% Mn.
Indicated - 23,700,000 long tons - 3-3/4% Mn.

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO :

DATE: Oct. 23, 1952

FROM :

SUBJECT: Adams Brothers
Section 29, T. 47 N., R. 29 W.

In a zone 700 feet wide and 2,600 feet long, it is estimated from drill holes that 11,000,000 tons of ore has been developed which averages 4.95 percent Mn and 25 percent iron.

The average depth of holes in the glacial drift was 115 feet and 76 feet in the carbonate slates. These holes did not pass through the slates and generally these slates in other areas have proved to be about 150 feet thick. Hence, it is probable that the above tonnage in the area would be doubled.

STANDARD FORM NO. 64

Office Memorandum • UNITED STATES GOVERNMENT

TO :

DATE: Oct. 21, 1952

FROM :

SUBJECT: Bureau of Mines Report
Manganese in Cuyuna Range

	Long Tons	
Easily Accessible	21,500,000	Measured
Easily Accessible	13,000,000	Indicated 5.4%
Stripping or underground mining	77,400,000	Measured
Stripping or underground mining	183,000,000	Indicated 5.8% Mn.
Easily accessible	7,000,000	Inferred 5% Mn.
Easily accessible	198,000,000	Inferred 4.5% Mn.
TOTAL	499,900,000 Long Tons	

FILE COPY
SURNAME:

Selfridge
Chapman
Hedges
Lemmon
FEJohnson

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

C C
O O
P P
Y

5-15-52

Adams Brothers Company
12th Floor, Fidelity Building
Duluth, Minnesota

Re: Dockets Nos. DMEA 2404, 2405, and 2406 - Manganese
SE$\frac{1}{4}$, SW$\frac{1}{4}$, Sec. 20, T. 47 N., R., 29 W.
NW$\frac{1}{4}$ Sec. 29, T. 47 N., R. 29 W.
SE$\frac{1}{4}$, NE$\frac{1}{4}$, Sec. 30, T. 47 N., R. 29 W.
Crow Wing County, Minnesota

Gentlemen:

Your applications for exploration assistance and other data available to us have been carefully reviewed.

Although it is probable that your proposed drilling programs would add a substantial tonnage of material containing approximately 5 percent manganese to the known large refractory reserves of this district, it is doubtful that the programs would result in a discovery or development from which production might be made that would be of benefit to the present National Defense Program. We regret, therefore, to inform you that your applications are denied.

We wish to thank you for your interest in the Defense Minerals Program and for bringing these properties to our attention.

Sincerely yours,

/S/ C. O. Mittendorf (fw)

Acting Administrator
Defense Minerals Exploration
Administration

TLChapman:FEJohnson:ls
5/13/52

cc: Adm. Reading File
Docket
G. C. Selfridge
T. L. Chapman
Operating Committee
Field Team, Region 5
N. B. Melcher, USBM
T. P. Thayer, USGS

FILE COPY
SURNAME:

UNITED STATES
DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

Acting Administrator, DMEA

May 8, 1952

Chapman
Selfridge
Lachmann

Iron and Ferro-Alloy Division, DMEA

Denial of exploration projects in the amount of $100,030.00
Dockets Nos. DMEA 2404, 2405, and 2406
Adams Brothers Company
SE¼, SW¼, Sec. 20, T. 47 N., R. 29 W.
NW¼ Sec. 29, T. 47 N., R. 29 W.
SE¼, NE¼, Sec. 30, T. 47 N., R. 29 W.
Crow Wing County, Minnesota

The denial of the subject applications by this Division is based on the following information:

(1) The measured, indicated and inferred reserves of manganiferous-bearing material of this district, containing approximately 5 percent manganese, amount to about 500 million tons (See Bureau of Mines' memorandum). The relatively small tonnage that would be added to the above reserves would be of no help to the present war effort.

(2) The metallurgical problems of these refractory ores have not been completely worked out up to the present time and until such a time as these problems have been satisfactorily completed, there is little use in adding to the present reserves.

(3) The "ores" in this area are covered by about 170 feet of overburden, which is frequently inundated by the floods of the Mississippi River. Hence mining would be a problem as stripping would necessitate the removal of about four tons of waste for each ton of "ore" mined. The pits would be wet and would possibly be flooded in flood seasons. Underground mining is not feasible for this grade of ore in this area.

George C. Selfridge

G. C. Selfridge, Chief
Iron and Ferro-Alloy Division

TLChapman:ls

Copy to: Admn. Reading File
Docket
G. C. Selfridge
T. L. Chapman
Operating Committee
M. D. Crittenden, USGS
N. B. Melcher, USBM

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
APR 4 1952

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
WASHINGTON 25, D. C.

March 26, 1952

Memorandum

To: George C. Selfridge, DMEA

From: Norwood B. Melcher

Subject: DMEA 2404, 2405, 2406 - Adams Brothers Co., Cuyuna Range, Minnesota, Manganese

The total amount requested for this work is $100,030. This sum is broken down as follows:

	DMEA 2404	DMEA 2405	DMEA 2406
Drilling (surface and ledge).....	$17,610	$33,760	$13,580
Geology.....	1,560	2,960	1,480
Engineering.....	1,800	3,450	1,700
Sampling.....	1,000	1,970	980
Assays.....	650	1,230	600
Metallurgy.....	2,000	3,700	1,900
Overhead.....	2,100	4,000	2,000
Total.....	$26,720	$51,070	$22,240

Thus, drilling accounts for 65 percent of the amount requested and metallurgy 7.6 percent.

It is believed that any work in connection with the development of these iron-manganese deposits of the Cuyuna Range should be considered in relation to the development of other extensive deposits of low-grade ore in the United States. These are Artillery Peak, Arizona; Three Kids, Nevada; Batesville, Arkansas; Philipsburg, Montana. The Chamberlain, South Dakota, and Aroostook, Maine, deposits are also extensive, but satisfactory extraction methods have not yet been developed for these ores.

Copy to: Field Team (2)

The Bureau of Mines is currently working on the beneficiation of Artillery Peak ores at its Boulder City and Salt Lake City stations. The Tucson, Arizona, station is working on the processing of southwestern manganese ores, the Rolla, Missouri, station on ores from Aydelotte and other properties, Arkansas, and College Park on ores from Aroostook, Maine. The Aydelotte property is part of the Batesville deposit. The manganese is finely divided and difficult of beneficiation; the Aroostook ores are highly siliceous.

Work on the Cuyuna ores is being done at the Minneapolis station under two headings: Concentration of the manganese-bearing carbonate slate from the Cuyuna range, and recovery of a ferro-grade product from Cuyuna ores by leaching-high temperature sulfatization of manganese. In the first case, the object of the investigation is to demonstrate that a manganese-iron concentrate containing about 7 percent silica can be produced on a commercial scale. It is believed by those in charge of the investigation that the concentrate, after removal of most of the contained manganese by leaching, would be a suitable iron product for the blast furnace and the manganese would be recovered from the leach solution as a ferro-grade product.

R. I. 3649, Laboratory Experiments on Sulfur Dioxide-Sulfuric Acid Leaching of Black and Brown Manganiferous Iron Ores of the Cuyuna Range of Minnesota, by C. Travis Anderson (1942) states that typical samples of Cuyuna brown and black ores were leached with sulfur dioxide to obtain an extraction of at least 80 percent of the manganese and a solution low enough in iron and phosphorous to yield a sinter meeting specifications for Grade A manganese ore. The sulfuric acid is obtained by admitting a controlled amount of air along with the SO_2. A pilot-plant test was proposed.

A confidential report on the concentration of Cuyuna ores, issued by the Rolla station of the Bureau of Mines (F. D. DeVaney, 1940) stated that on the basis of experimental work done, the process deserved consideration. Cost figures, while not complete, indicated that the cost of producing concentrates from the black ore was not excessive. Based on the emergency prices for manganese at the time, there remained a favorable margin between the value of the product and the cost of producing them. Brown ores of the Cuyuna district were characterized as those containing 2 to 10 percent Mn, 35 to 45 percent Fe, approximately 10 percent SiO_2, and phosphorous as high as 0.2 and 0.3 percent; black ores, 8 to 30 percent Mn, 20 to 35 percent Fe, 15 to 30 percent SiO_2, and 0.02 to 0.10 percent P. Recently,

The bureau of mines is currently working on the beneficiation of artificially dust ores at its Boulder City and Salt Lake City stations. The Tucson, Arizona, station is working on the manganese of sublimation manganese ores, the Rolla, Missouri, station on ores from Apjelotte and other properties, Minnesota, and Calliope Park on ores from Crosbook, Idaho. The Apjelotte property is part of the Mesaville deposit. The manganese is finely divided and difficult of beneficiation; the Crosbook ores are slightly siliceous.

Work on the Cayuna ores is being done at the Minneapolis station under the leadership Concentration of the manganese-bearing carbonate slate from the Cayuna range, and recovery of a ferro-grade product from Cayuna ores by leaching-high temperature milletization of manganese. In the first case, the object of the investigation is to demonstrate that a manganese-iron concentrate containing about 7 percent silica can be produced on a commercial scale. It is believed by those in charge of the investigation that the concentrate, after removal of most of the combined manganese by leaching, would be a suitable iron product for the blast furnace and the manganese would be recovered from the leach solution as a ferro-grade product.

R. I. 3649, laboratory experiments on Butte chemical-nitrate Acid Leaching of Black and Brown Manganiferous Iron Ores of the Cayuna Range of Minnesota, by G. Travis Anderson (1942) states that typical samples of Cayuna Brown and Black ores were leached with sulfur dioxide to obtain an extraction of at least 85 percent of the manganese and a solution low enough in iron and phosphorus to yield a higher meeting specifications for Grade A manganese ore. The sulfuric acid is obtained by admitting a controlled amount of air along with the SO_2. A pilot-plant test was proposed.

A confidential report on the concentration of Cayuna ores, issued by the Rolla station of the Bureau of Mines (T. G. Lefkowy, 1940) stated that on the basis of experimental work done, the process deserved consideration. Cost figures, while not complete, indicated that the cost of producing concentrates from the Black ore was not excessive. Based on the emergency prices for manganese at the time, there remained a favorable margin between the value of the product and the cost of producing them. Brown ores of the Cayuna district were characterized as those containing 2 to 10 percent Mn, 35 to 40 percent Fe, approximately 10 percent SiO_2, and phosphorus as high as 0.2 and 0.3 percent; black ores, 8 to 20 percent Mn, 20 to 25 percent Fe, 15 to 30 percent SiO_2, and 0.02 to 0.10 percent P. Recently,

however, it has been recognized that it is impractical to attempt to make a clear distinction between black and brown ores. Concentration of black ores to ferro-grade concentrates consisted of gravity concentration, crushing, flotation, roasting, and magnetic separation to produce a nonmagnetic product of ferromanganese grade and a magnetic product of spiegeleisen grade, and nodulizing both products.

The Progress Report and Preliminary Estimate of Manganiferous Resources on the Cuyuna Iron Range, Minnesota, by F. F. Grout, Carl Wood, and Walter E. Lewis, mentions the comprehensive atlas in preparation to include all available logs of drill holes and complete maps of open-pit mines. The following estimates of reserves is taken from this report, page 13:

"Adding the measured and indicated resources and computing the average analyses results in 34,500,000 tons of easily accessible material, carrying 5.4 percent manganese, and 260,400,000 tons of material where stripping or underground mining is required, carrying 5.8 percent manganese; and including the inferred resources and computing the average analyses results in 41,500,000 tons of easily accessible material, carrying 5.4 percent manganese, and 458,000,000 tons of material where stripping or underground mining is required, carrying 5.5 percent manganese."

The following breakdown may be made from the figures given in Table 6 of the report:

	Long tons	
Easily accessible material.....	21,500,000	measured
Easily accessible material.....	13,000,000	indicated
	34,500,000	(5.4% Mn)
Stripping or underground mining...	77,400,000	measured
Stripping or underground mining...	183,000,000	indicated
	260,400,000	(5.8% Mn)
Easily accessible.....	7,000,000	inferred (5% Mn)
Easily accessible.....	198,000,000	inferred (4.5% Mn)
	205,000,000	inferred

Easily accessible	Stripping or underground	
34,500,000	77,400,000	
7,000,000	183,000,000	
41,500,000 (5.4% Mn)	198,000,000	
	458,400,000	(5.5% Mn)
	41,500,000	(5.4% Mn)
Total.....	499,900,000	

However, it has been recognized that it is impractical to attempt to make a clear distinction between black and brown ores. Concentration of black ores to ferro-grade concentrates consisted of gravity concentration, crushing, flotation, roasting, and magnetic separation to produce a nonmagnetic product of ferromanganese grade and a magnetic product of spiegeleisen grade, and utilizing both products.

The Progress Report and Preliminary Estimate of Manganiferous Resources on the Quyuna Iron Range, Minnesota, by J. W. Gruner, Carl Wood, and Walter E. Lewis, mentions the comprehensive atlas in preparation to include all available logs of drill holes and complete maps of open-pit mines. The following estimates of reserves is taken from this report, page 13:

"Adding the measured and indicated reserves and computing the average analyses results in 24,300,000 tons of easily accessible material, carrying 5.4 percent manganese, and 700,400,000 tons of material where stripping or underground mining is required, carrying 5.2 percent manganese; and including the inferred reserves and computing the average analyses results in 1,500,000 tons of easily accessible material, carrying 5.4 percent manganese, and 455,400,000 tons of material where stripping or underground mining is required, carrying 5.5 percent manganese."

The following breakdown may be made from the figures given in table 6 of the report:

	Long tons	
Easily accessible material.....	21,500,000	measured
Easily accessible material.....	13,000,000	indicated
	34,500,000	(5.45 Mn)
Stripping or underground mining...	77,400,000	measured
Stripping or underground mining...	183,000,000	indicated
	260,400,000	(5.28 Mn)
Easily accessible.....	7,000,000	inferred (5% Mn)
Easily accessible.....	148,000,000	inferred (4.5% Mn)
	205,000,000	inferred

	Easily accessible	Stripping or underground
	34,500,000	77,400,000
	7,000,000	183,000,000
	41,500,000 (5.45 Mn)	148,000,000
		408,400,000 (5.35 Mn)
		41,500,000 (5.45 Mn)
Total.....		499,900,000

With regard to the metallurgical processes considered, the report lists the following:

Sulfur dioxide-air leaching process
Ammonium sulfate leach
Sulfuric acid roast
Ammonium carbonate leach

The report states that after consideration of the results of these laboratory tests, it appears that the sulfur dioxide-air leach is not suitable for the production of a ferro-grade product from the manganese-iron carbonate slates of the Cuyuna range but that, if after further experimental work, a method of roasting can be devised to convert most of the manganese into readily soluble manganese dioxide, a sulfur dioxide leach may be successfully applied to the carbonate slate.

Although the proposed exploration program appears worthwhile to define the limits and grade of the reserves, information as to plans for subsequent treatment of the ores to bring them to metallurgical grade is lacking. Presumably, the applicant intends to use the SO_2-SO_3 method but details of any such plan are lacking. As indicated above, pilot-plant work on Cuyuna ores by the leaching-high temperature sulfatization is being carried out at the Minneapolis station of the Bureau of Mines.

Norwood B. Melcher

EXPLORATION

Subject: DMEA-2405
Re: Exploration Loan
Cuyuna Range Property
March 4, 1952

Mr. Robert M. Adams, President
Adams Brothers Company
12th Floor Fidelity Building
Duluth 2, Minnesota

My dear Mr. Adams:

This will acknowledge receipt of your application dated February 1, 1952 for a loan under the Defense Production Act of 1950.

Your application was assigned Docket Number DMEA-2405 and referred to the Iron and Ferro-Alloys Division.

Kindly refer to DMEA-2405 in any future correspondence relating to your application.

Kindly forward another copy of form MF-103 and MF-100 and attachments to each to this office.

Sincerely yours,

R. E. ADAMS

Robert E. Adams
Acting Administrative Officer

Enclosures (2)

Form MF-103
(Revised June 1951)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Budget Bureau No. 42-R1035.1.

MF-103 Should Be Filed With General Technical Data Form MF-100

APPLICATION FOR AID FOR AN EXPLORATION PROJECT PURSUANT TO MINERAL ORDER 5, UNDER DEFENSE PRODUCTION ACT OF 1950

Not To Be Filled in by Applicant

Docket No. DMEA-2405
Metal or Mineral
Date Received 3-3-52
Amount $
Participation (Government %)

Name and address of applicant

ADAMS BROTHERS COMPANY
12TH FLOOR FIDELITY BUILDING
DULUTH 2, MINNESOTA

Date February 1, 1952

If you have already filed MF-100, give date filed _____, type of assistance requested _____,

DMA Docket Number (if available) _____

INSTRUCTIONS

Read Mineral Order 5, Regulations Governing Government Aid in Defense Projects, before completing this application. Submit four copies each, of the signed application form, General Technical Data Form MF-100, and answers to questions as specified, to Defense Minerals Administration, Department of the Interior, Washington 25, D. C., or to the nearest field executive office thereof, with your name and address on each sheet of the application and all accompanying papers. If you have previously filed MF-100, it is not necessary to file it again. However, you should indicate in space provided above the type of assistance previously applied for (loans, procurement contracts, etc.) and DMA Docket Number, if available. *When a question is inapplicable it should be so stated in the form.* Additional sheets should be attached in answering any questions or in supplying additional information. IF YOU CANNOT ANSWER A QUESTION, SO STATE.

1. (*a*) Give a description of the real property that will be in any way involved in the exploration project, including any existing mine or operating property. See attached sheet.

   (*b*) If you are not the owner of the property, submit a copy of the lease, purchase option, or other agreements under which you are authorized to operate the property with each copy of your application. See attached sheet.

   (*c*) Give the legal description of the exact parcel, plot, or area upon which the exploration is to be conducted. See attached sheet.

   NOTE: (1) If both areas are the same, so state. The only obligation to repay the Government is from the net earnings from any commercial discovery made in the area specified in (*c*) above in which the exploration is to be conducted, and the expenditure of funds which may be charged as costs of the project must be limited to that area or to work necessary to perform the exploration in that area.

   (2) If applicant is not the owner of the property or if there are any liens or encumbrances against the property, copy of agreements of claimants, lienors, encumbrances, and lessors subordinating their interests in the property to the interest of the Government under the Exploration Project Contract will be required for attachment to the Contract.

2. (*a*) What metals or minerals do you expect to find? See attached sheet.

   (*b*) Furnish statement of the geologic features of your property, giving type of ore deposit and reasons for expecting to find commercial ore bodies. Illustrate with maps or sketches. If you have a geologic or engineering report, or assay maps showing width and grade, please send them with application, stating whether or not you wish to have them returned.

   See attached sheet.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAR 3 - 1952

16—64067-2

The information requested in questions 3, 4, 5, 6, 7, 8, and 9 below should be answered specifically and in detail, as this information will be attached to and incorporated as part of the Exploration Project Contract, if such contract is entered into with you by the Government.

ANSWER EACH QUESTION ON SEPARATE SHEETS OF PAPER AND SUBMIT A COPY OF EACH ANSWER FOR EACH COPY OF YOUR APPLICATION.

3. (*a*) Describe fully the proposed work and give the total cost of the project.

   (*b*) State the time required to start the project and to complete it.

4. Submit a map or sketch of the property involved showing a plan (and cross section, if needed) of the present mine workings and the *location of the proposed exploration work* as related to geologic features, such as contacts, veins, ore-bearing beds, etc.

5. Furnish an itemized list of existing facilities, buildings, installations, and fixtures with a statement of the cost of any necessary rehabilitation or repairs to put into useful and operable condition. None.

6. Furnish a detailed list of additional facilities, buildings, and fixtures to be purchased, installed, or erected by you, with the estimated cost of each item. None.

7. Furnish a detailed list of operating equipment, separated into items to be—

   (*a*) Rented

   (*b*) Purchased

   (*c*) Furnished by you

   with the rental, purchase price, or depreciation of each item, as the case may be, to be charged as a cost of the project.

8. Furnish an itemized schedule of labor, by numbers and classes (miners, muckers, etc.) and of supervisors by numbers and positions, with the maximum wages or salaries to be paid to each. See Item 9.

9. Furnish a detailed list with estimated cost of each item for materials, supplies, engineering, assaying, accounting, power, water, utilities, and any other items not provided for above.

10. (*a*) How much are you prepared to invest in the proposed project?

    (*b*) Is this amount sufficient to pay your part of the cost of the project, in accordance with the regulations on Government participation (Sec. 9 of MO–5)?

11. State any conditions or circumstances regarding the property not sufficiently brought out by the foregoing questions.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

ADAMS BROTHERS COMPANY
(Name of company)

By [signature]
(Signature of authorized official)

February 1, 1952
(Date)

President
(Title)

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—64067-2

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

1. (a) While the belt of manganese bearing formation may extend northeast and southwest through the south part of Section 29, through the northwesterly part of Section 29, across Section 30, all in Township 47, Range 29, and into the Southeast quarter (SE¼) of Section 25, Township 47, Range 30, the exploration will be limited to a smaller area. See 1 (c).

(b) The applicant holds under two leases the Northwest quarter (NW¼) of Section 29, Township 47, Range 29.

(c) The explorations contemplated would be upon the Northwest quarter (NW¼) of Section 29, Township 47, Range 29.

Copies of the two leases are attached.

Enclosure to Application
Form MF-103

2. (a) Manganese.

(b) Section 29 Area Manganese.

The presence of manganese in this area has been known since the early days of the Cuyuna Range of Minnesota.

The early prospectors on the Cuyuna were first attracted to the district by well defined lines of high magnetic intensity which were later found to be associated with ore bodies. Extensive dip-needle surveys were made over much of the area now known as the Cuyuna Range, and the lines of high magnetic intensity were followed in the exploration by drilling.

One of these magnetic lines occurs in Sections 29 and 30, Township 47 North, Range 29 West, in Crow Wing County, Minnesota. The area was first explored in 1906 as a possible source of iron ore. The glacial drift overburden was found to be from eighty feet to one hundred and fifty feet and more.

A greenish gray formation was found under the drift which was reported by various explorers as schist, slate and iron formation. Where there was oxidation

and the formation was stained red, some of the drill cores and cuttings were assayed and found to carry from twenty to thirty per cent iron. Manganese was not important at the time.

The Cuyuna Range manganiferous ores were well known and attracted wide attention during the World War I period, 1915-1918, and the search for additional manganiferous ore deposits was intense. The Section 29 Area was explored and abandoned because, although drill samples assayed between five and ten per cent dry manganese in places, the per cent of iron was low and the material was not a typical Cuyuna Range manganiferous ore.

More recently, in 1949, the area was again explored in an attempt to find, by closer drilling, manganiferous ore lenses in the wide belt of manganese bearing schists and slates. After twelve holes were drilled by one company in Section 30 and five holes in Section 29 by another company, the area was again abandoned as a source of manganiferous ore suitable for blast furnace use.

When the critical shortage of manganese for ferromanganese was brought to the attention of Adams

Brothers Company, who were recent explorers of Section 29, an investigation was started.

Although the material found in the Section 29 Area was evidently unsuitable for the preparation of manganiferous ore, it was thought it might be suitable for the preparation of ferro-manganese.

A rough estimate of an area seven hundred feet wide and twenty-six hundred feet long, in the area where the most drilling data are available, showed 11,000,000 tons of material assaying 4.95 per cent manganese and 25.59 per cent iron which had been classified as slates and schists from the drill cores and cuttings.

The average depth of the drill holes included in the estimate was one hundred and fifteen feet in glacial drift and seventy-six feet in ledge. There is no evidence that the holes were drilled through the formation.

The remnants of the samples available from the drillings were found to be inadequate for the determination of the suitability of the material for the preparation of ferro-manganese.

The explorations in the area indicate the presence of a large tonnage of manganese bearing carbonaceous

slates which are unsuitable for the preparation of manganiferous ore for blast furnace use. These slates may be an economic source of manganese for other purposes.

The drilling to date has not determined the structure or the extent of the manganese bearing formations either in length, width or depth. It is proposed to determine these factors by further churn and diamond drilling: First, by deeper holes to determine the structure and economic value of the material; then, if the formations are found to be suitable for the economic production of manganese, by shallower holes to determine the extent.

It is estimated that the preliminary exploration program in the NW¼, Section 29-47-29, should include four (4) structure holes and thirty-two (32) areal holes, which would require approximately thirty-three hundred (3300) feet of drilling through surface and fourteen hundred and eighty (1480) feet of drilling in ledge.

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

3. (a) It is estimated that the preliminary exploration program in the NW¼, Section 29-47-29, should include four (4) structure holes and thirty-two (32) areal holes, which would require approximately thirty-three hundred (3300) feet of drilling through surface and fourteen hundred and eighty (1480) feet of drilling in ledge.

(b) The drilling could start about May 1, 1952, and the program could be completed within two years.

Note proposed drilling program outlined on map:

O Areal

Os Structure

Enclosure to Application
Form MF-103

ADAMS [illegible] COMPANY

Duluth 2, Minnesota

4. See attached maps:

   1. Map of area.

   2. Map showing geology and proposed drilling program.

   3. Logs of drilling.

   4. Geological map.

Enclosure to Application
Form MF-103

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

7. (a), (b) and (c)

Adams Brothers Company will contract with ADEX Corporation to do the drilling.

Two complete churn and diamond drill outfits equipped for drilling BX holes in ledge will be furnished.

Enclosure to Application
Form HF-103

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

9. **Drilling**

3300 ft. surface drilling @ $5.00	$16,500	
1480 ft. ledge drilling @ $10.50	15,540	
Carbon loss, estimated	1,720	
		$33,760

Note: This particular ledge drilling will involve especial care, hence delays and more than ordinary cost.

Geology

At the rate of $600 a month	2,960

Engineering

At the rate of $500 a month	3,460

Sampling

At the rate of $300 a month (Including preparation and filing)	1,970

Assays

Estimated	1,230

Metallurgy

Estimated	3,700

Overhead

Travel, office, misc.	4,000
	$51,070

Enclosure to Application
Form MF-103

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

10. (a) $18,770.00.

(b) Yes.

Enclosure to Application
Form MF-103

11. The general plan of this program together with the reasons for it is as follows. This area on the Cuyuna Range has long been known as one of the areas of iron formation, containing manganese units, but it has not been developed, beyond exploratory drilling on various occasions by various parties. The material found by said drilling has not been of the type which is presently used on the Cuyuna Range for blast furnace mixture. However, this material might be a source of obtaining manganese for other uses.

The formation might extend over a considerable area, both in length and width. Accordingly, over two miles of possible strike has been acquired; in the main, by leaseholds on privately held property and by application to the State of Minnesota on lands owned by it.

In general, the drilling has shown both oxide and carbonate, each containing more or less manganese. If this oxide-carbonate belt should have sufficient continuity in length, width and depth, it might afford a substantial amount of manganese bearing formation which, from a mining standpoint, would appear to have no particularly bad features.

Located as this ground is on the north part of the Cuyuna Range, which district has all the necessary facilities for mining, a few of the favorable features for the development of a mine might be cited as follows:

A. The Mississippi River close by is a source of water.

B. The Minnesota Power & Light Company hi-line crossing the property.

C. Adequate roads from the towns of the Cuyuna Range and passable automobile roads on the property.

D. Railroad transportation within reasonable spur-track length by the Northern Pacific and the Soo Line railways.

E. Nearby towns with schools and other facilities.

F. Favorable surface conditions for stripping prevail upon the Cuyuna Range.

In view of the drilling which has been done to date and the character of the material thus made available for examination and assaying, the following questions present themselves:

A. Is the deposit continuous enough in length, width, and depth to provide ample tonnage for substantial open pit operation?

B. Will the average manganese content be sufficient?

4. Can the manganese be concentrated and extracted metallurgically and economically so as to compete with other sources of manganese?

The only way these questions can be answered would be, first, by further drilling to determine to some extent the limits of the formation and the apparent average manganese content; secondly, to drill several BX holes for the extraction of core for further testing purposes.

We plan on putting one drill on what might be termed area drilling; first, to try to find the North and South edges of the formation as well as enough indicated length and thickness. This work, of course, would show the average manganese content.

Another drill would drill in the present known heart of the area for the primary purpose of extracting core for determining the nature of the material.

In addition to the operation of drilling, samples would be taken to our sample house at Ironton and prepared and filed in the usual manner, assays being obtained from the Lerch Brothers laboratory in Crosby. At this stage the samples would thus be available for examination and for preparation for testing.

The drilling would naturally be guided from an engineering standpoint by the results being currently obtained and sufficient geological services would be made available so that the geology would be studied concurrently with the drilling and naturally as a guide thereto.

As to tests, various possible methods would be investigated and tried out and metallurgical advice and facilities would be made available for this phase of work.

It would not be intended to drill out this formation to its uttermost limits; that would be too long and expensive and unwarranted at this stage. But while endeavoring to learn by the only present available method (testing drill cores) whether the material can be metallurgically and economically handled, it is, of course, equally important to find that there is a sufficiently large and continuous ore body containing sufficient manganese. Hence, the drilling program is for two purposes.

If this drilling program, together with the geological and metallurgical studies, demonstrated a worthwhile source of manganese units, then it would be reasonable to assume that the necessary development would follow.

The proposed investment would of course not permit any development. It would probably be inadequate for a

complete exploration of the whole area but that is not necessary at this stage. It should be enough to cover sufficient drilling for the uses noted and sufficient technical studies to demonstrate whether the area warrants further development.

As to the qualifications of Adams Brothers Company, in 1949 Robert M. Adams formed this company to take over his new mining business in Minnesota and carry on his further explorations.

Cuyler Adams discovered the Cuyuna Range about 1905, and the Adams family has been actively associated with the exploration and development of the Range ever since.

Robert M. Adams started exploring on the Range in 1915 and has continued from that time. The following properties resulted from his work:

Maroco Mine
Evergreen Mine and Smelting plant
Hillcrest Group (Hillcrest, Arko and Alstead)
Mangan-Louise Group
Rabbit Lake Group
Virginia

THIS AGREEMENT, Made this 1st day of August, 1949, by and between GEORGE E. WHITFORD and DENORA ALMA WHITFORD, his wife, of Carrington, North Dakota, Parties of the First Part, Lessors, and ROBERT M. ADAMS, of Duluth, Minnesota, Party of the Second Part, Lessee,

W I T N E S S E T H :

I. That the Lessors, in consideration of the sum of One Dollar ($1.00) to them in hand paid by the Lessee, the receipt whereof is hereby acknowledged, and in further consideration of the covenants and conditions herein contained to be kept and performed by the Lessee, do hereby let, lease and demise to the Lessee, for the term of fifty (50) years from and after the date hereof, the following described lands and premises situated in the County of Crow Wing and State of Minnesota, viz:

> All of the surface and an undivided one-half (½) interest in the minerals in the Northwest Quarter (NW¼) in Section Twenty-nine (29), Township Forty-seven (47) north, Range Twenty-nine (29) west, according to the United States Government survey thereof;

which premises are leased to the Lessee for the purposes of exploring for, mining, taking out and removing therefrom the iron, manganese and manganiferous ore which is or which hereafter may be found on, in or under said lands, together with the right to construct all buildings, make all excavations, openings, ditches, drains, railroad and wagon roads and other improvements upon said premises, which are or may become necessary or suitable for the mining and removing of iron, manganese and manganiferous ore from said premises; provided, however, that the Lessee shall have the right at any time to terminate this agreement by giving sixty

(60) days' written notice to the Lessors by mail, and in case notice is given it may be addressed to the said Lessors or others having their estate in the premises at the place or places, respectively, at which royalty is for the time being payable hereunder, and thereupon the foregoing lease and demise shall terminate, and all arrearages and sums which may be due under the same up to and including the date of its determination as set forth in such notice shall be paid upon settlement and adjustment thereof. The Lessors further agree that the Lessee shall have the right, under this agreement, to contract with others to work such mine or mines, or any part thereof or to sub-contract the same, and the use of said land or any part thereof for the purpose of mining iron, manganese and manganiferous ore, with the same rights and privileges as are herein granted to the said Lessee, and that the uninterrupted right of the Lessee to take, use and carry away the iron, manganese and manganiferous ore herein provided for shall continue unsuspended, notwithstanding any disagreement between the parties hereto respecting the same or this contract, provided he shall duly pay for all ore taken or agreed to be taken at the time or times and in the manner stipulated in and by this contract.

In case the premises leased hereby shall be mined and operated by the Lessee in connection with other adjoining property not covered hereby, the Lessee shall have the right to use said demised premises for proper ingress and egress to and from said adjoining properties by railroad tracks, wagon roads, pole lines, launders, pipe lines, etc., and shall have the right to handle all such property as one unit in the proper operation thereof, mining through one property to another, provided, always that the ore mined from the demised premises shall be kept separate and apart

and separately accounted for in accordance herewith.

II. The Lessee, in consideration of the premises, hereby covenants and agrees to and with the Lessors, that the Lessee will on the 20th days of January, April, July and October or on the day ensuing if that day falls on Sunday, in each year during the period hereinbefore stipulated, or during the period this contract continues in force, commencing with October 20, 1949, pay to or for the use of the Lessors, at such bank or banks in any city of the United States as the Lessors or their successors in interest may from time to time in writing designate, for all the iron, manganese and manganiferous ore mined and removed from said lands during the three months preceding the first of the month in which payment is to be made as aforesaid, at the rate of twenty-five cents (25¢) per ton, or twelve and one-half cents (12½¢) per ton on the Lessors' interest, each ton to be reckoned at two thousand two hundred forty (2240) pounds; such payments to be made to the said Lessors, their respective successors or assigns, in proportion to their respective interests in said lands above described. Lessee at the time of such payment, shall transmit to the Lessors an exact and truthful statement of the amount of ore removed during the three months for which payments shall be made. The ores so taken by the Lessee from the said land, shall be weighed by the railway company transporting the same from the said land, which weights shall prima facie determine the quantity as between the parties hereto, but if said ore is delivered by the Lessee to the buyer thereof on the Cuyuna Range, weights of a standard Merrick weightometer which shall at all times be open to the inspection of the Lessors shall be accepted in lieu of railway weights. Said Lessee shall furnish the Lessors monthly

statements showing the aforesaid weights, the right, however, being hereby conceded to the Lessors, to inspect, review and test the correctness of said railway company's scales or the local buyer's weightometer and weights at any time and in such manner as the Lessors may see fit to adopt, it bein understood that any errors in this respect, when ascertained, shall be recognized and corrected in their accounts.

Should any ore be removed from the premises to lands adjoining for the purpose of washing or otherwise treating the same to make it merchantable, in accordance with the subsequent provisions herein contained, the Lessee will, during the life of the lease, furnish to the Lessors monthly sworn statements showing how much ore has been so removed for that purpose the previous month, together with assays thereof, and also the quantity of ore washed, screened, dried or otherwise treated, during such previous month.

If the lessee should cancel this lease, as heretofore provided, he shall pay royalty on all ore so removed, whether the same has actually been washed, screened, dried or otherwise treated, or not.

III. The Lessee further covenants to pay all taxes and assessments, ordinary and extraordinary, general or specific, which may be levied or assessed against the Lessors' interest upon the demised lands and upon the whole thereof, and on the iron, manganese and manganiferous ore mined thereon, and all improvements and personal property thereon, while this lease shall continue in force, and to furnish the Lessors with duplicate tax receipts showing the payment of all such assessments, or taxes; provided,

however, that the Lessee shall always have the right to contest in the courts or otherwise, the validity of any such taxes or assessments in case he shall deem the same unlawful, unjust, unequal or excessive, or to take such other steps or proceedings as he may deem necessary to secure a cancelation, reduction, re-adjustment, or equalization thereof, before he shall be required to pay and discharge the same or any part thereof; but provided, further, that the Lessee shall not permit or suffer any lands and premises, or any part thereof, to be sold at any time for any taxes or assessments. And upon the termination of this lease by surrender or otherwise, as herein provided, the Lessee will peaceably surrender possession of said lands and the whole thereof to the Lessors, and said taxes levied and assessed for the year in which such termination shall become effective as to the whole of said premises or as to any government sub-division shall be prorated so that the Lessee shall be liable for the proportion of said taxes for said year as is represented by the portion of said time during which the Lessee held said surrendered premises.

IV. The Lessee further covenants and agrees that he will mine and ship from said lands, or pay royalty thereon to Lessors at the rate of twelve and one-half cents (12½¢) per ton, two thousand (2,000) gross tons as an annual agreed minimum output until April 1, 1952, and that from and after April 1, 1952, the annual minimum output shall be ten thousand (10,000) tons as long as this lease shall remain in effect. If in any one or more years while this lease shall remain in force the Lessee shall not actually ship from said lands the full quantity of the said agreed minimum output, the Lessee will nevertheless pay to the Lessors minimum or advance

royalty as hereinafter provided, in addition to the royalty paid for iron, manganese and manganiferous ore actually shipped during that year, such sum as shall, together with the amount paid as royalty for iron, manganese and manganiferous ore actually shipped during said year, amount to the minimum royalty payment required for that year. Said advance or minimum royalty shall be paid in equal quarterly installments upon the quarter days and in the manner herein provided for the payment of royalty on ore actually shipped. If in any quarter year the Lessee shall ship a quantity of iron, manganese and manganiferous ore in excess of one-fourth (¼) of the agreed minimum output for that year, the royalty on all such ore in excess of one-fourth (¼) of such annual minimum output may be satisfied, so far as the royalty on such excess will apply, by the application of any advance or minimum royalty ever theretofore paid under this lease and for which no ore has been actually shipped and of which no previous application has actually been made; and any royalty actually paid upon ore shipped in any quarter of any calender year in excess of one-fourth (¼) of the agreed minimum output for that year shall be in discharge, so far as the royalty on such excess will apply, of the obligation to pay advance or minimum royalty for any subsequent quarter or quarters of such calender year. The obligation of the Lessee to pay advance or minimum royalties as aforesaid shall continue in force without regard to the quantity or quality of the iron, manganese and manganiferous ore existing on said land during the full term of this lease or until the same shall be determined or surrendered or assigned in the manner herein provided; and in case of an assignment of said lease the obligation to mine

ore or make such agreed yearly minimum royalty payment, as well as all other provisions of the lease shall bind the assignee as fully as the Lessee is bound hereby.

V. It is mutually understood and agreed that upon the termination of this agreement, whether by acts or the parties or by limitation, the Lessee shall have ninety (90) days in which to remove all engines, tools, machinery, railroad tracks and structures erected or placed by said Lessee on said lands, but shall not remove or impair any supports placed in the mines, nor any timbers or frameworks necessary to the use and maintenance of the shafts or other approaches to the mines, nor any tramways within the mines.

VI. The Lessee shall open, use and work said mines in such manner only as is usual and customary in the skillful and proper mining operations of similar character when conducted by the proprietors themselves, so as not to do, cause or permit any unnecessary or unusual permanent injury to the same, or inconvenience or hindrance in the subsequent operating of the same mine or mines; and in the working of said mine or mines the Lessee shall deposit all earth, overburden, rocks and other useless material or rubbish at such places and in such manner as will not conflict with or embarrass the future operating of said mines, and so long as such condition is complied with the Lessee shall have the right to deposit waste or overburden from adjoining properties operated by the Lessee in connection with the demised premises upon said demised premises, provided that in advance of dumping upon any such area the engineers of both parties agree upon any necessary drilling that might be needed in addition to that that might be

already done to prove such area as negative; that such drilling be done by the Lessee and such area or areas reasonably proven not to contain open pit ore, which, all factors considered, would be merchantable; and provided, further, that for any waste from adjoining premises deposited upon the demised premises a like amount of waste from the demised premises shall be deposited elsewhere within two years from the date of such deposit or dumping, so that no greater amount of waste shall be deposited upon the demised premises than would have resulted had the demised premises been operated alone; and provided, further, that no notice of cancellation of lease shall be effective until this clause has been complied with and such dumping equalized as between the demised premises and adjoining properties.

VII. The Lessors expressly reserve for themselves (and the parties hereto agree that the Lessors shall have) the right, by their agents or servants, to enter into and upon the above demised premises, and any part or parts thereof, at any time or times, to inspect and survey the same and measure the quantity of ores that shall have been mined or removed therefrom, not unnecessarily or unreasonably hindering or interfering with the work or operations of the Lessee.

The Lessee shall and will furnish the Lessors monthly reports of all explorations carried on by means of drills from the surface, including blue prints showing location of all drill holes thereon, also analyses of all iron found therein; and will furnish Lessors annually, mine maps showing all drifts, crosscuts and openings in any mine or mines opened and worked on the premises.

The covenants, terms and conditions of this lease shall run with the land and be in all respects binding and operative on all sublessees and assignees under the said Lessee but this lease shall not be assigned by the Lessee, except to reputable and responsible parties.

VIII. The Lessee agrees that when this lease shall for any cause terminate he will enter or cause to be entered a certificate of that fact upon the proper book of record in the county where the land is situated, provided this lease shall have been recorded there.

IX. This lease is granted and accepted upon condition that if the royalty hereby reserved, or any part thereof, be and remain unpaid after the days and times above specified, or the Lessee shall fail to keep any of the covenants or conditions herein expressed to be kept and performed by him, and if any such failure or failures in payments or otherwise shall continue for sixty (60) days after the receipt by him of written notice from the Lessors, specifying the default, neglect and failure complained of, then, and from thenceforth, and in either of said events, but not otherwise, it shall be lawful for the Lessors, at their option, to take possession of the said leased premises with or without any previous process whatever, to re-enter and have and possess the same as fully as if no lease had been given to the Lessee, and the said Lessee and all parties claiming under him shall be wholly excluded therefrom, and this lease shall become and be wholly void and at an end and subject to the provisions of Paragraph V hereof.

X. It is understood that the Lessors reserve, and shall

at all times have, possess and hold a lien upon all ore mined and all improvements made on said premises by the Lessee as security for any unpaid balances of money due under this contract, whether for royalties, taxes or otherwise, such balances being deemed to be treated as balances of purchase money, and which lien may be enforced against such property in like manner as liens conferred by chattel mortgages are or may be entitled to be enforced under the laws of the State of Minnesota.

XI. The Lessee covenants that while this lease shall remain in force and until it is surrendered or assigned, as in manner herein provided, he will protect the said land and the improvements and iron ore in stockpile thereon from all mechanics' and laborers' liens and keep the title to the same free and clear from all clouds or encumbrances arising from such liens in any way caused by his mining operations thereon or the use and occupation thereof by the Lessee, his agents, servants, employees or contractors.

XII. If, in any of said mining operations, ore shall be encountered which shall not then be merchantable in its natural condition, the Lessee shall have the right, at his option, to wash, dry, screen, sinter, agglomerate, or otherwise treat the same in order to make it merchantable, and the royalties shall accrue on such product or concentrate and not upon the crude ore before such treatment.

Such treatment of the ore in order to make it merchantable may be conducted by the Lessee either on the lands hereby

demised or on other lands adjoining or in the vicinity available for the installation of a plant adapted to such purpose; provided, that the Lessee shall first obtain the fee or a lease of such other lands in such manner that the lien and rights of the Lessors herein shall be fully preserved and protected as to any ore removed thereto, to the same extent as though it remained on the land herein demised. The removal of such ore from the demised premises to any other lands, for the purpose of treating the same, shall not be deemed to be a mining and removal from the demised premises so as to cause the royalty herein provided for to accrue thereon, until the ore product or concentrate of such treatment shall be actually shipped and weighed by the railroad company transporting the same.

In the event of said ore being treated on lands other than the demised premises, it shall be treated separately and apart from all other ores and separately loaded on railroad cars for transportation, and separately weighed, and all of said operations shall be conducted and completed within a reasonable length of time.

In case such plant is erected on the demised premises, the Lessee agrees that any refuse or waste arising from such treatment shall be so deposited as to not interfere with the future operation of any mine or mines on the demised premises.

In the event that said second party or his assigns desires to treat ore from other properties operated by him or his assigns in the vicinity in a plant erected on said demised premises,

it is hereby agreed that the second party or his assigns shall have the right, power, use and authority to treat said other ores upon the property of the first parties herein demised, provided that all waste, refuse and unused materials from said washing operations of ore from other property shall be deposited outside and beyond the limits of the property of the first parties. The intention being that no greater amount of waste or refuse or unused material shall be left or deposited upon the demised premises than would result from the washing of the ore from said demised premises, and it is further agreed by the parties hereto that the party of the second part shall take all reasonable steps required by the parties of the first part for keeping a separate account of the ore mined from the demised premises from the ore washed from other properties, and all expenses connected with such operations shall be borne by the party of the second part, and said washing plant shall be entirely clean of ore of the parties of the first part before starting to wash the ores from other properties.

The Lessee further agrees to conduct the washing, screening, drying or other treatment in a good and workmanlike manner according to good engineering practice and so as not to cause any greater waste of such ore than is necessary to render the ore product or concentrate thereof merchantable and of proper composition and character for successful and economical furnace use, and that he will use in any such treatment proper machinery and appliances to that end.

XIII. The Lessors hereby represent and covenant with the Lessee that they are at the time of the execution and delivery

hereof well seized in fee of said surface and one-half (½) interest in said minerals by good, perfect and indefeasible title thereto; that the said land is free from all liens and encumbrances, and that they have the right to lease the same in manner as in this lease provided, and the Lessee in the quiet and peaceable possession of said land, as Lessee, for the purpose of this lease provided, they will to the extent of their respective interests forever warrant and defend against all lawful claims or demands whatsoever, save and except only such claims or demands as may be created by the Lessee, or exist by virtue of his acts or omissions.

XIV. Arbitration Clause. In case any disagreement or controversy shall arise between the parties hereto relative to the observance or fulfillment of the terms and obligations hereof by either party, then such controversy or disagreement shall be determined by arbitration. Either party may within thirty (30) days after such disagreement arises, demand arbitration thereof, and the party or parties making such demand shall in writing specify the matter to be submitted to arbitration and at the same time choose and nominate some disinterested competent person to act as an arbitrator; thereupon, within ten (10) days after receipt of such written notice, the other party to this lease shall in writing choose and nominate a disinterested and competent arbitrator and the two arbitrators so chosen shall forthwith select a third arbitrator, giving written notice to both parties of the choice so made and fixing a place and time for meeting not later than thirty (30) days thereafter, at which both parties may appear and be heard touching such controversy. The decision of said arbitrators shall be made in writing within thirty (30) days after the

completion of hearings thereon, and when signed by a majority of them shall be final and conclusive upon both parties and the award so made shall be forthwith complied with. In case the notified party shall neglect or refuse to choose and nominate an arbitrator as above provided and within the time hereinabove specified, then the party demanding arbitration shall have the right to name the second arbitrator. In case the two chosen by either of the above methods shall fail to agree upon a third arbitrator and give notice as herein provided, such third arbitrator shall, upon the application of either party, be named by the person who may then be holding the office of Judge of the United States District Court in and for the district in which Duluth, Minnesota, is located, or the person holding an office which corresponds to such office as now extant if it shall then have been abolished.

The expense of any such arbitration, including reasonable compensation for the arbitrators shall be paid by the party against which the award therein shall be made, or as otherwise determined by the arbitrators.

XV. Notwithstanding any of the other provisions herein contained, whenever it is necessary to serve upon or deliver to the parties to this lease any written notice, periodical report, statement or other instrument, the same shall be sent by registered mail addressed to the parties at the following addresses, respectively, or to such other addresses as they may specify to each other in writing, viz.:

If to Lessors: George E. Whitford
Carrington, North Dakota

If to Lessee: Robert M. Adams
Duluth 2, Minnesota

XVI. It is further mutually agreed that all the grants, stipulations and conditions herein expressed shall apply to and bind the successors, heirs, executors, administrators and assigns (as the case may be) of the said respective parties.

IN WITNESS THEREOF, this instrument has been executed by the parties hereto as of the day and the year first above written.

Signed and acknowledged
in the presence of:

/s/ G. A. Burnham

/s/ Lucille Burnham
As to George E. Whitford and
Denora Alma Whitford

/s/ George E. Whitford
George E. Whitford

/s/ Denora Alma Whitford
Denora Alma Whitford

FIRST PARTIES

/s/ R. O. Lee

/s/ Cherrill M. Adams
As to Robert M. Adams

/s/ Robert M. Adams
Robert M. Adams

SECOND PARTY

AMENDMENTS TO LEASE AGREEMENT

IT IS UNDERSTOOD THAT the within Section XVII and Section XVIII are additional sections to the hereunto attached lease made and entered into between George E. Whitford and Denora Alma Whitford, his wife and Robert A. Adams, dated on the 1st day of August A. D., 1949, and are to have the same force and effect as if they were fully incorporated and set forth in the body of said lease with the same section numbers, and are as follows, to-wit:

SECTION XVII. That nothing contained in said lease shall in any manner whatsoever effect or contradict or be in conflict with the provisions of that certain easement made and entered into by and between the said George E. Whitford and Denora Alma Whitford, his wife, and the Minnesota Power & Light Company, which said easement grants to said company the perpetual right, privilege and easement to construct, maintain and operate an electric transmission line, with the necessary poles, cross-arms, guy, braces, wires and appurtenances, across the real estate in said lease described, said easement being dated December 20, 1948.

SECTION XVIII. That the Lessors in said lease reserve unto themselves all growing timber on said land, and that the said lessee shall not cut or destroy any growing timber thereon, except any such as may interfere with the operation of any mining done on said land.

Dated August 1, 1949

/s/ George E. Whitford

/s/ Denora Alma Whitford
Lessors

/s/ Robert M. Adams
Lessee

STATE OF NORTH DAKOTA)
) ss
COUNTY OF FOSTER)

On this 1st day of August, 1949, before me, a Notary Public, personally appeared GEORGE E. WHITFORD and DENONA ALMA WHITFORD, his wife, to me known to be the persons described in and who executed the foregoing instrument, and acknowledged that they executed the same as their free act and deed.

/s/ C. A. Burnham
Notary Public

My commission expires 10-25-51.

STATE OF MINNESOTA)
) ss
COUNTY OF CROW WING)

On this 26th day of August, 1949, before me, a Notary Public, personally appeared ROBERT E. ADAMS, to me known to be the person described in and who executed the foregoing instrument, and acknowledged that he executed the same as his free act and deed.

/s/ H. O. Lee
Notary Public

My commission expires 4-14-54

THIS AGREEMENT, Made this 1st day of June, 1949, by and between AGNES LOUISE DEAN, HELEN DEAN HOGAN, CAROLYN E. DEAN, as Executors of the Estate of ALFRED J. DEAN, Deceased, Parties of the First Part, Lessors, and ROBERT M. ADAMS, of Duluth, Minnesota, Party of the Second Part,

W I T N E S S E T H :

I. That the Lessors, in consideration of the sum of One Dollar ($1.00) to them in hand paid by the Lessee, the receipt whereof is hereby acknowledged, and in further consideration of the covenants and conditions herein contained to be kept and performed by the Lessee, do hereby let, lease and demise to the Lessee, for the term of fifty (50) years from and after the date hereof, the following described lands and premises situated in the County of Crow Wing and State of Minnesota, viz:

> An Undivided One-half (½) interest in the minerals in the Northwest Quarter (NW¼) in Section Twenty-nine, (29), Township Forty-seven (47) north, Range Twenty-nine (29) west, according to the United States Government survey thereof;

which premises are leased to the Lessee for the purposes of exploring for, mining, taking out and removing therefrom the iron, manganese and manganiferous ore which is or which hereafter may be found on, in or under said lands, together with the right to construct all buildings, make all excavations, openings, ditches, drains, railroad and wagon roads and other improvements upon said premises, which are or may become necessary or suitable for the mining and removing of iron, manganese and manganiferous ore from said premises; provided, however, that the Lessee shall have the

right at any time to terminate this agreement by giving sixty (60) days written notice to the Lessors by mail and in case notice is given it may be addressed to the said Lessors (or others having their estate in the premises) at the place (or places, respectively,) at which royalty is for the time being payable hereunder, and thereupon the foregoing lease and demise shall terminate, and all arrearages and sums which may be due under the same up to and including the date of its determination as set forth in such notice shall be paid upon settlement and adjustment thereof. The Lessors further agree that the Lessee shall have the right, under this agreement, to contract with others to work such mine or mines, or any part thereof or to sub-contract the same, and the use of said land or any part thereof for the purpose of mining iron, manganese and manganiferous ore, with the same rights and priviliges as are herein granted to the said Lessee, and that the uninterrupted right of the Lessee to take, use and carry away the iron, manganese and manganiferous ore herein provided for shall continue unsuspended, notwithstanding any disagreement between the parties hereto respecting the same or this contract, provided he shall duly pay for all ore taken or agreed to be taken at the time or times and in the manner stipulated in and by t is contract.

In case the premises leased hereby shall be mined and operated by the Lessee in connection with other adjoining property not covered hereby, the Lessee shall have the right to use said demised premises for proper ingress and egress to and from said adjoining properties by railroad tracks, wagon roads, pole lines, launders, pipe lines, etc., and shall have the right to

handle all such property as one unit in the proper operation thereof, mining through one property to another, provided, always that the ore mined from the demised premises shall be kept separate and apart and separately accounted for in accordance herewith.

II. The Lessee, in consideration of the premises, hereby covenants and agrees to and with the Lessors, that the Lessee will on the 20th days of January, April, July and October or on the day ensuing if that day falls on Sunday, in each year during the period hereinoefore stipulated, or during the period this contract continues in force, commencing with October 20, 1949, pay to or for the use of the Lessors, at such bank or banks in any city of the United States as the Lessors or their successors in interest may from time to time in writing designate, for all the iron, manganese and manganiferous ore mined and removed from said lands during the three months preceding the first of the month in which payment is to be made as aforesaid, at the rate of twenty-five cents (25¢) per ton, or twelve and one-half cents (12½¢) per ton on the Lessors one-half (½) interest, each ton to be reckoned at two thousand two hundred forty (2240) pounds; such payments to be made to the said Lessors, their respective successors or assigns, in proportion to their respective interests in said lands above described. Lessee at the time of such payment, shall transmit to the Lessors an exact and truthful statement of the amount of ore removed during the three months for which payments shall be made. The ores so taken by the Lessee from the said land, shall be weighed by the railway company transporting the same from the said land, which weights shall prima facie determine the quantity as

between the parties hereto, but if said ore is delivered by the Lessee to the buyer thereof on the Cuyuna Range, weights of a standard Merrick weightometer which shall at all times be open to the inspection of the Lessors shall be accepted in lieu of railway weights. Said Lessee shall furnish the Lessors monthly statements showing the aforesaid weights, the right, however, being hereby conceded to the Lessors, to inspect, review and test the correctness of said railway company's scales or the local buyer's weightometer and weights at any time and in such manner as the Lessors may see fit to adopt, it being understood that any errors in this respect, when ascertained, shall be recognized and corrected in their accounts.

Should any ore be removed from the premises to lands adjoining for the purpose of washing or otherwise treating the same to make it merchantable, in accordance with the subsequent provisions herein contained, the Lessee will, during the life of the lease, furnish to the Lessors monthly sworn statements showing how much ore has been so removed for that purpose the previous month, together with assays thereof, and also the quantity of ore washed, screened, dried or otherwise treated, during such previous month.

If the Lessee should cancel this lease, as heretofore provided, he shall pay royalty on all ore so removed, whether the same has actually been washed, screened, dried or otherwise treated, or not.

III. The Lessee further covenants to pay all taxes and assessments, ordinary and extraordinary, general or specific, which may be levied or assessed against the Lessors' one-half (½) interest

upon the demised lands and upon the whole thereof, and on the iron, manganese and manganiferous ore mined thereon, and all improvements and personal property thereon, while this lease shall continue in force, and to furnish the Lessors with duplicate tax receipts showing the payment of all such assessments, or taxes; provided, however, that the Lessee shall always have the right to contest in the courts or otherwise, the validity of any such taxes or assessments in case he shall deem the same unlawful, unjust, unequal or excessive, or to take such other steps or proceedings as he may deem necessary to secure a cancelation, reduction, re-adjustment, or equalization thereof, before he shall be required to pay and discharge the same or any part thereof; but provided, further, that the Lessee shall not permit or suffer any lands and premises, or any part thereof, to be sold at any time for any taxes or assessments. And upon the termination of this lease by surrender or otherwise, as herein provided, the Lessee will peaceably surrender possession of said lands and the whole thereof to the Lessors, and said taxes levied and assessed for the year in which such termination shall become effective as to the whole of said premise or as to any government sub-division shall be pro rated so that the Lessee shall be liable for the proportion of said taxes for said year as is represented by the portion of said time during which the Lessee held said surrendered premises.

IV. The Lessee further covenants and agrees that he will mine and ship from said lands, or pay royalty thereon to Lessors at the rate of twelve and one-half cents (12½¢) per ton, two thousand (2,000) gross tons as an annual agreed minimum output until April 1, 1962, and that from and after April 1, 1962, the annual minimum output shall be ten thousand (10,000) tons as long as this lease

shall remain in effect. If in any one or more years while this lease shall remain in force the Lessee shall not actually ship from said lands the full quantity of the said agreed minimum output, the Lessee will nevertheless pay to the Lessors minimum or advance royalty as hereinafter provided, in addition to the royalty paid for iron, manganese and manganiferous ore actually shipped during that year, such sum as shall, together with the amount paid as royalty for iron, manganese and manganiferous ore actually shipped during said year, amount to the minimum royalty payment required for that year. Said advance or minimum royalty shall be paid in equal quarterly installments upon the quarter days and in the manner herein provided for the payment of royalty on ore actually shipped. If in any quarter year the Lessee shall ship a quantity of iron, manganese and manganiferous ore in excess of one-fourth (¼) of the agreed minimum output for that year, the royalty on all such ore in excess of one-fourth (¼) of such annual minimum output may be satisfied, so far as the royalty on such excess will apply, by the application of any advance or minimum royalty ever theretofore paid under this lease and for which no ore has been actually shipped and of which no previous application has actually been made; and any royalty actually paid upon ore shipped in any quarter of any calendar year in excess of one-fourth (¼) of the agreed minimum output for that year shall be in discharge, so far as the royalty on such excess will apply, of the obligation to pay advance or minimum royalty for any subsequent quarter or quarters of such calendar year. The obligation of the Lessee to pay advance or minimum royalties as aforesaid shall continue in force without regard to the quantity or quality of the iron, manganese and man-

ganiferous ore existing on said land during the full term of this lease or until the same shall be determined or surrendered or assigned in the manner herein provided; and in case of an assignment of said lease the obligation to mine ore or make such agreed yearly minimum royalty payment, as well as all other provisions of the lease shall bind the assignee as fully as the Lessee is bound hereby.

V. It is mutually understood and agreed that upon the termination of this agreement, whether by acts of the parties or by limitation, the Lessee shall have ninety (90) days in which to remove all engines, tools, machinery, railroad tracks and structures erected or placed by said Lessee on said lands, but shall not remove or impair any supports placed in the mines, nor any timbers or frameworks necessary to the use and maintenance of the shafts or other approaches to the mines, nor any tramways within the mines.

VI. The Lessee shall open, use and work said mines in such manner only as is usual and customary in the skillful and proper mining operations of similar character when conducted by the proprietors themselves, so as not to do, cause or permit any unnecessary or unusual permanent injury to the same, or inconvenience or hindrance in the subsequent operating of the same mine or mines; and in the working of said mine or mines the Lessee shall deposit all earth, overburden, rocks and other useless material or rubbish at such places and in such manner as will not conflict with or embarrass the future operating of said mines, and so long as such condition is complied with the Lessee shall have the right

to deposit waste or overburden from adjoining properties operated by the Lessee in connection with the demised premises upon said demised premises, provided that in advance of dumping upon any such area the engineers of both parties agree upon any necessary drilling that might be needed in addition to that that might be already done to prove such area as negative; that such drilling be done by the Lessee and such area or areas reasonably proven not to contain open pit ore, which, all factors considered, would be merchantable; and provided, further, that for any waste from adjoining premises deposited upon the demised premises a like amount of waste from the demised premises shall be deposited elsewhere within two years from the date of such deposit or dumping, so that no greater amount of waste shall be deposited upon the demised premises than would have resulted had the demised premises been operated alone; and provided, further, that no notice of cancellation of lease shall be effective until this clause has been complied with and such dumping equalized as between the demised premises and adjoining properties.

VII. The Lessors expressly reserve for themselves (and the parties hereto agree that the Lessors shall have) the right, by their agents or servants, to enter into and upon the above demised premises, and any part or parts thereof, at any time or times, to inspect and survey the same and measure the quantity of ores that shall have been mined or removed therefrom, not unnecessarily or unreasonably hindering or interfering with the work or operations of the Lessee.

The lessee shall and will furnish the Lessors monthly reports of all explorations carried on by means of drills from

the surface, including blue prints showing location of all drill holes thereon, also analyses of all iron found therein; and will furnish Lessors annually, mine maps showing all drifts, crosscuts and openings in any mine or mines opened and worked on the premises.

The covenants, terms and conditions of this lease shall run with the land and be in all respects binding and operative on all sublessees and assignees under the said Lessee but this lease shall not be assigned by the Lessee, except to reputable and responsible parties.

VIII. The Lessee agrees that when this lease shall for any cause terminate he will enter or cause to be entered a certificate of that fact upon the proper book of record in the county where the land is situated, provided this lease shall have been recorded there.

IX. This lease is granted and accepted upon condition that if the royalty hereby reserved, or any part thereof, be and remain unpaid after the days and times above specified, or the Lessee shall fail to keep any of the covenants or conditions herein expressed to be kept and performed by him, and if any such failure or failures in payments or otherwise shall continue for sixty (60) days after the receipt by him of written notice from the Lessors, specifying the default, neglect and failure complained of, then, and from thenceforth, and in either of said events, but not otherwise, it shall be lawful for the Lessors, at their option, to take possession of the said leased premises with or without any previous process whatever, to re-enter and have and possess the

same as fully as if no lease had been given to the Lessee, and the said Lessee and all parties claiming under him shall be wholly excluded therefrom, and this lease shall become and be wholly void and at an end and subject to the provisions of Paragraph V hereof.

X. It is understood that the Lessors reserve, and shall at all times have, possess and hold a lien upon all ore mined and all improvements made on said premises by the Lessee as security for any unpaid balances of money due under this contract, whether for royalties, taxes or otherwise, such balances being deemed to be treated as balances of purchase money, and which lien may be enforced against such property in like manner as liens conferred by chattel mortgages are or may be entitled to be enforced under the laws of the State of Minnesota.

XI. The Lessee covenants that while this lease shall remain in force and until it is surrendered or assigned, as in manner herein provided, he will protect the said land and the improvements and iron ore in stockpile thereon from all mechanics' and laborers' liens and keep the title to the same free and clear from all clouds or encumbrances arising from such liens in any way caused by his mining operations thereon or the use and occupation thereof by the Lessee, his agents, servants, employees or contractors.

XII. If, in any of said mining operations, ore shall be encountered which shall not then be merchantable in its natural condition, the Lessee shall have the right, at his option, to wash, dry, screen, sinter, agglomerate, or otherwise treat the same in order to make it merchantable, and the royalties shall accrue on

such product or concentrate and not upon the crude ore before such treatment.

Such treatment of the ore in order to make it merchantable may be conducted by the Lessee either on the lands hereby demised or on other lands adjoining or in the vicinity available for the installation of a plant adapted to such purpose; provided, that the Lessee shall first obtain the fee or a lease of such other lands in such manner that the lien and rights of the Lessors herein shall be fully preserved and protected as to any ore removed thereto, to the same extent as though it remained on the land herein demised. The removal of such ore from the demised premises to any other lands, for the purpose of treating the same, shall not be deemed to be a mining and removal from the demised premises so as to cause the royalty herein provided for to accrue thereon, until the ore product or concentrate of such treatment shall be actually shipped and weighed by the railroad company transporting the same.

In the event of said ore being treated on lands other than the demised premises, it shall be treated separately and apart from all other ores and separately loaded on railroad cars for transportation, and separately weighed, and all of said operations shall be conducted and completed within a reasonable length of time.

In case such plant is erected on the demised premises, the Lessee agrees that any refuse or waste arising from such treatment shall be so deposited as to not interfere with the future operation of any mine or mines on the demised premises.

In the event that said second party or his assigns des-

ires to treat ore from other properties operated by him or his assigns in the vicinity in a plant erected on said demised premises, it is hereby agreed that the second party or his assigns shall have the right, power, use and authority to treat said other ores upon the property of the first parties herein demised, provided that all waste, refuse and unused materials from said washing operations of ore from other property shall be deposited outside and beyond the limits of the property of the first parties. The intention being that no greater amount of waste or refuse or unused material shall be left or deposited upon the demised premises than would result from the washing of the ore from said demised premises, and it is further agreed by the parties hereto that the party of the second part shall take all reasonable steps required by the parties of the first part for keeping a separate account of the ore mined from the demised premises from the ore washed from other properties, and all expenses connected with such operations shall be borne by the party of the second part, and said washing plant shall be entirely clean of ore of the parties of the first part before starting to wash the ores from other properties.

The Lessee further agrees to conduct the washing, screening drying or other treatment in a good and workmanlike manner according to good engineering practice and so as not to cause any greater waste of such ore than is necessary to render the ore product or concentrate thereof merchantable and of proper composition and character for successful and economical furnace use, and that he will use in any such treatment proper machinery and appliances to that end.

XIII. The Lessors hereby represent and covenant with the Lessee that they are at the time of the execution and delivery hereof well seized in fee of said one-half (½) interest in said minerals by good, perfect and indefeasible title thereto; that the said land is free from all liens and encumbrances, and that they have the right to lease the same in manner as in this lease provided, and the Lessee in the quiet and peaceable possession of said land, as Lessee, for the purpose of this lease provided, they will to the extent of their respective interests forever warrant and defend against all lawful claims or demands whatsoever, save and except only such claims or demands as may be created by the Lessee, or exist by virtue of his acts or omissions.

XIV. Arbitration Clause. In case any disagreement or controversy shall arise between the parties hereto relative to the observance or fulfillment of the terms and obligations hereof by either party, then such controversy or disagreement shall be determined by arbitration. Either party may within thirty (30) days after such disagreement arises, demand arbitration thereof, and the party or parties making such demand shall in writing specify the matter to be submitted to arbitration and at the same time choose and nominate some disinterested competent person to act as an arbitrator; thereupon, within ten (10) days after receipt of such written notice, the other party to this lease shall in writing choose and nominate a disinterested and competent arbitrator and the two arbitrators so chosen shall forthwith select a third arbitrator, giving written notice to both parties of

the choice so made and fixing a place and time for meeting not later than thirty (30) days thereafter, at which both parties may appear and be heard touching such controversy. The decision of said arbitrators shall be made in writing within thirty (30) days after the completion of hearings thereon, and when signed by a majority of them shall be final and conclusive upon both parties and the award so made shall be forthwith complied with. In case the notified party shall neglect or refuse to choose and nominate an arbitrator as above provided and within the time hereinabove specified, then the party demanding arbitration shall have the right to name the second arbitrator. In case the two chosen by either of the above methods shall fail to agree upon a third arbitrator and give notice as herein provided, such third arbitrator shall, upon the application of either party, be named by the person who may then be holding the office of Judge of the United States District Court in and for the district in which Duluth, Minnesota, is located, or the person holding an office which corresponds to such office as now extant if it shall then have been abolished.

The expense of any such arbitration, including reasonable compensation for the arbitrators shall be paid by the party against which the award therein shall be made, or as otherwise determined by the arbitrators.

XV. Notwithstanding any of the other provisions herein contained, whenever it is necessary to serve upon or deliver to the parties to this lease any written notice, periodical report, statement or other instrument, the same shall be sent by registered

mail addressed to the parties at the following addresses, respectively, or to such other addresses as they may specify to each other in writing, viz.:

If to Lessors: Agnes Louise Dean
234 Allen Lane, St. Airy
Philadelphia 19, Pennsylvania

and to

Leonard E. Oelund, Attorney for Lessors
702 Thorpe Building
Minneapolis 2, Minnesota

If to Lessee: Robert H. Adams
Duluth 2, Minnesota

XVI. It is further mutually agreed that all the grants, stipulations and conditions herein expressed shall apply to and bind the successors, heirs, executors, administrators and assigns (as the case may be) of the said respective parties.

IN WITNESS WHEREOF, this instrument has been executed by the parties hereto as of the day and the year first above written.

Signed and acknowledged
in the presence of:

/s/
Leo F. Mc Innis

/s/ Jason C. Sawyer
As to Agnes Louise Dean

/s/ Victoria - Casali

/s/ H. W. Canadden
As to Helen Dean Bogan

/s/ Amanda Sanders

/s/ Ruth V. Rowe
As to Carolyn E. Dean

Estate of Alfred J. Dean, Deceased

/s/ Agnes Louise Dean
Agnes Louise Dean

/s/ Helen Dean Bogan
Helen Dean Bogan

/s/ Carolyn E. Dean

/s/ Gertrude E. Campbell

/s/ Frederick G. Dean
As to Harold F. Dean

/s/ Harold F. Dean
Harold F. Dean

As Executors

First Parties

/s/ Laura A. Wilson

/s/ Malcom H. Adams
As to Robert M. Adams

/s/ Robert M. Adams
Robert M. Adams

Second Party

STATE OF NEW HAMPSHIRE)
)ss
COUNTY OF CHESHIRE)

On this 13th day of June, 1949, before me, a Notary Public, personally appeared ANNIE LOUISE DEAN, to me know to be the person described in and who executed the foregoing instrument, and acknowledged that she executed the same as her free act and deed.

/s/ Norman T. Jackson
Notary Public
My commission expires 9/8/53

STATE OF CALIFORNIA)
)ss
COUNTY OF SANTA BARBARA)

On this 1st day of June, 1949, before me a Notary Public, personally appeared HELEN DEAN EDGAR, to me known to be the person described in and who executed the foregoing instrument, and acknowledged that she executed the same as her free act and deed.

/s/ Grace Walston
Notary Public
My commission expires 1/8/50

STATE OF CALIFORNIA)
) ss
COUNTY OF LOS ANGELES)

On this 3rd day of June, 1949, before me, a Notary Public, personally appeared CAROLYN E. DEAN, to me known to be the person described in and who executed the foregoing instrument, and acknowledged that she executed the same as her free act and deed.

/s/ Catherine Ellis
Notary Public

My commission expires 11/15/52

STATE OF VERMONT)
) ss
COUNTY OF windham)

On this 11th day of June, 1949, before me, a Notary Public, personally appeared HAROLD A. DEAN, to me known to be the person described in and who executed the foregoing instrument, and acknowledged that he executed the same as his free act and deed.

/s/ Gertrude E. Campbell
Notary Public

My commission expires 2/10/51

STATE OF MINNESOTA)
) ss
COUNTY OF ST. LOUIS)

On this 30th day of June, 1949, before me, a Notary Public, personally appeared ROBERT M. ADAMS, to me known to be the person described in and who executed the foregoing instrument, and acknowledged that he executed the same as his free act and deed.

/s/ Florence Shoberg
Notary Public

My commission expires 11/16/53

Form MF-103
(Revised June 1951)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Budget Bureau No. 42-R1035.1.

MF-103 Should Be Filed With General Technical Data Form MF-100

APPLICATION FOR AID FOR AN EXPLORATION PROJECT PURSUANT TO MINERAL ORDER 5, UNDER DEFENSE PRODUCTION ACT OF 1950

Not To Be Filled in by Applicant

Docket No. DMEA-2405
Metal or Mineral
Date Received 3-3-52
Amount $
Participation (Government %)

ADAMS BROTHERS COMPANY
12TH FLOOR FIDELITY BUILDING
DULUTH 2, MINNESOTA

Name and address of applicant

Date February 1, 1952

If you have already filed MF-100, give date filed ....., type of assistance requested .....,

DMA Docket Number (if available) .....

$51,070

INSTRUCTIONS

Read Mineral Order 5, Regulations Governing Government Aid in Defense Projects, before completing this application. Submit four copies each, of the signed application form, General Technical Data Form MF-100, and answers to questions as specified, to Defense Minerals Administration, Department of the Interior, Washington 25, D. C., or to the nearest field executive office thereof, with your name and address on each sheet of the application and all accompanying papers. If you have previously filed MF-100, it is not necessary to file it again. However, you should indicate in space provided above the type of assistance previously applied for (loans, procurement contracts, etc.) and DMA Docket Number, if available. *When a question is inapplicable it should be so stated in the form.* Additional sheets should be attached in answering any questions or in supplying additional information. IF YOU CANNOT ANSWER A QUESTION, SO STATE.

1. (*a*) Give a description of the real property that will be in any way involved in the exploration project, including any existing mine or operating property. See attached sheet.

   (*b*) If you are not the owner of the property, submit a copy of the lease, purchase option, or other agreements under which you are authorized to operate the property with each copy of your application. See attached sheet.

   (*c*) Give the legal description of the exact parcel, plot, or area upon which the exploration is to be conducted. See attached sheet.

   NOTE: (1) If both areas are the same, so state. The only obligation to repay the Government is from the net earnings from any commercial discovery made in the area specified in (*c*) above in which the exploration is to be conducted, and the expenditure of funds which may be charged as costs of the project must be limited to that area or to work necessary to perform the exploration in that area.

   (2) If applicant is not the owner of the property or if there are any liens or encumbrances against the property, copy of agreements of claimants, lienors, encumbrances, and lessors subordinating their interests in the property to the interest of the Government under the Exploration Project Contract will be required for attachment to the Contract.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAR 3 - 1952

2. (*a*) What metals or minerals do you expect to find? See attached sheet.

   (*b*) Furnish statement of the geologic features of your property, giving type of ore deposit and reasons for expecting to find commercial ore bodies. Illustrate with maps or sketches. If you have a geologic or engineering report, or assay maps showing width and grade, please send them with application, stating whether or not you wish to have them returned. See attached sheet.

16—64067-2

The information requested in questions 3, 4, 5, 6, 7, 8, and 9 below should be answered specifically and in detail, as this information will be attached to and incorporated as part of the Exploration Project Contract, if such contract is entered into with you by the Government.

ANSWER EACH QUESTION ON SEPARATE SHEETS OF PAPER AND SUBMIT A COPY OF EACH ANSWER FOR EACH COPY OF YOUR APPLICATION.

3. (*a*) Describe fully the proposed work and give the total cost of the project.

   (*b*) State the time required to start the project and to complete it.

4. Submit a map or sketch of the property involved showing a plan (and cross section, if needed) of the present mine workings and the *location of the proposed exploration work* as related to geologic features, such as contacts, veins, ore-bearing beds, etc.

5. Furnish an itemized list of existing facilities, buildings, installations, and fixtures with a statement of the cost of any necessary rehabilitation or repairs to put into useful and operable condition. None.

6. Furnish a detailed list of additional facilities, buildings, and fixtures to be purchased, installed, or erected by you, with the estimated cost of each item. None.

7. Furnish a detailed list of operating equipment, separated into items to be—

   (*a*) Rented

   (*b*) Purchased

   (*c*) Furnished by you

   with the rental, purchase price, or depreciation of each item, as the case may be, to be charged as a cost of the project.

8. Furnish an itemized schedule of labor, by numbers and classes (miners, muckers, etc.) and of supervisors by numbers and positions, with the maximum wages or salaries to be paid to each. See Item 9.

9. Furnish a detailed list with estimated cost of each item for materials, supplies, engineering, assaying, accounting, power, water, utilities, and any other items not provided for above.

10. (*a*) How much are you prepared to invest in the proposed project?

    (*b*) Is this amount sufficient to pay your part of the cost of the project, in accordance with the regulations on Government participation (Sec. 9 of MO–5)?

11. State any conditions or circumstances regarding the property not sufficiently brought out by the foregoing questions.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

ADAMS BROTHERS COMPANY
(Name of company)

By /s/ Robert M. Adams
(Signature of authorized official)

February 1, 1952
(Date)

President
(Title)

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—64067-2

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

1. (a) While the belt of manganese bearing formation may extend northeast and southwest through the south part of Section 20, through the northwesterly part of Section 29, across Section 30, all in Township 47, Range 29, and into the Southeast quarter (SE¼) of Section 25, Township 47, Range 30, the exploration will be limited to a smaller area. See 1 (c).

(b) The applicant holds under two leases the Northwest quarter (NW¼) of Section 29, Township 47, Range 29.

(c) The explorations contemplated would be upon the Northwest quarter (NW¼) of Section 29, Township 47, Range 29.

Copies of the two leases are attached.

Enclosure to Application
Form MF-103

2. (a) Manganese.

(b) Section 29 Area Manganese.

The presence of manganese in this area has been known since the early days of the Cuyuna Range of Minnesota.

The early prospectors on the Cuyuna were first attracted to the district by well defined lines of high magnetic intensity which were later found to be associated with ore bodies. Extensive dip-needle surveys were made over much of the area now known as the Cuyuna Range, and the lines of high magnetic intensity were followed in the exploration by drilling.

One of these magnetic lines occurs in Sections 29 and 30, Township 47 North, Range 29 West, in Crow Wing County, Minnesota. The area was first explored in 1906 as a possible source of iron ore. The glacial drift overburden was found to be from eighty feet to one hundred and fifty feet and more.

A greenish gray formation was found under the drift which was reported by various explorers as schist, slate and iron formation. Where there was oxidation

and the formation was stained red, some of the drill cores and cuttings were assayed and found to carry from twenty to thirty per cent iron. Manganese was not important at the time.

The Cuyuna Range manganiferous ores were well known and attracted wide attention during the World War I period, 1915-1918, and the search for additional manganiferous ore deposits was intense. The Section 29 Area was explored and abandoned because, although drill samples assayed between five and ten per cent dry manganese in places, the per cent of iron was low and the material was not a typical Cuyuna Range manganiferous ore.

More recently, in 1949, the area was again explored in an attempt to find, by closer drilling, manganiferous ore lenses in the wide belt of manganese bearing schists and slates. After twelve holes were drilled by one company in Section 30 and five holes in Section 29 by another company, the area was again abandoned as a source of manganiferous ore suitable for blast furnace use.

When the critical shortage of manganese for ferromanganese was brought to the attention of Adams

Brothers Company, who were recent explorers of Section 29, an investigation was started.

Although the material found in the Section 29 Area was evidently unsuitable for the preparation of manganiferous ore, it was thought it might be suitable for the preparation of ferro-manganese.

A rough estimate of an area seven hundred feet wide and twenty-six hundred feet long, in the area where the most drilling data are available, showed 11,000,000 tons of material assaying 4.95 per cent manganese and 25.58 per cent iron which had been classified as slates and schists from the drill cores and cuttings.

The average depth of the drill holes included in the estimate was one hundred and fifteen feet in glacial drift and seventy-six feet in ledge. There is no evidence that the holes were drilled through the formation.

The remnants of the samples available from the drillings were found to be inadequate for the determination of the suitability of the material for the preparation of ferro-manganese.

The explorations in the area indicate the presence of a large tonnage of manganese bearing carbonaceous

slates which are unsuitable for the preparation of manganiferous ore for blast furnace use. These slates may be an economic source of manganese for other purposes.

The drilling to date has not determined the structure or the extent of the manganese bearing formations either in length, width or depth. It is proposed to determine these factors by further churn and diamond drilling: First, by deeper holes to determine the structure and economic value of the material; then, if the formations are found to be suitable for the economic production of manganese, by shallower holes to determine the extent.

It is estimated that the preliminary exploration program in the NW¼, Section 29-47-29, should include four (4) structure holes and thirty-two (32) areal holes, which would require approximately thirty-three hundred (3300) feet of drilling through surface and fourteen hundred and eighty (1480) feet of drilling in ledge.

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

3. (a) It is estimated that the preliminary exploration program in the NW¼, Section 29-47-29, should include four (4) structure holes and thirty-two (32) areal holes, which would require approximately thirty-three hundred (3300) feet of drilling through surface and fourteen hundred and eighty (1480) feet of drilling in ledge.

(b) The drilling could start about May 1, 1952, and the program could be completed within two years.

Note proposed drilling program outlined on map:

O Areal

Os Structure

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ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

4. See attached maps:

   1. Map of area.
   2. Map showing geology and proposed drilling program.
   3. Logs of drilling.
   4. Geological map.

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ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

7. (a), (b) and (c)

Adams Brothers Company will contract with ADEX Corporation to do the drilling.

Two complete churn and diamond drill outfits equipped for drilling BX holes in ledge will be furnished.

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ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

9. Drilling

3300 ft. surface drilling @ $5.00	$16,500	
1480 ft. ledge drilling @ $10.50	15,540	
Carbon loss, estimated	1,720	
		$33,760

Note: This particular ledge drilling will involve especial care, hence delays and more than ordinary cost.

Geology	
At the rate of $600 a month	2,960
Engineering	
At the rate of $500 a month	3,450
Sampling	
At the rate of $200 a month (Including preparation and filing)	1,970
Assays	
Estimated	1,230
Metallurgy	
Estimated	3,700
Overhead	
Travel, office, misc.	4,000
	$51,070

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ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

10. (a) $12,770.00.

(b) Yes.

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11. The general plan of this program together with the reasons for it is as follows. This area on the Cuyuna Range has long been known as one of the areas of iron formation, containing manganese units, but it has not been developed, beyond exploratory drilling on various occasions by various parties. The material found by said drilling has not been of the type which is presently used on the Cuyuna Range for blast furnace mixture. However, this material might be a source of obtaining manganese for other uses.

The formation might extend over a considerable area, both in length and width. Accordingly, over two miles of possible strike has been acquired; in the main, by leaseholds on privately held property and by application to the State of Minnesota on lands owned by it.

In general, the drilling has shown both oxide and carbonate, each containing more or less manganese. If this oxide-carbonate belt should have sufficient continuity in length, width and depth, it might afford a substantial amount of manganese bearing formation which, from a mining standpoint, would appear to have no particularly bad features.

Located as this ground is on the north part of the Cuyuna Range, which district has all the necessary facilities for mining, a few of the favorable features for the development of a mine might be cited as follows:

A. The Mississippi River close by is a source of water.

B. The Minnesota Power & Light Company hi-line crossing the property.

C. Adequate roads from the towns of the Cuyuna Range and passable automobile roads on the property.

D. Railroad transportation within reasonable spur-track length by the Northern Pacific and the Soo Line railways.

E. Nearby towns with schools and other facilities.

F. Favorable surface conditions for stripping prevail upon the Cuyuna Range.

In view of the drilling which has been done to date and the character of the material thus made available for examination and assaying, the following questions present themselves:

A. Is the deposit continuous enough in length, width, and depth to provide ample tonnage for substantial open pit operation?

B. Will the average manganese content be sufficient?

C. Can the manganese be concentrated and extracted metallurgically and economically so as to compete with other sources of manganese?

The only way these questions can be answered would be, first, by further drilling to determine to some extent the limits of the formation and the apparent average manganese content; secondly, to drill several BX holes for the extraction of core for further testing purposes.

We plan on putting one drill on what might be termed area drilling; first, to try to find the North and South edges of the formation as well as enough indicated length and thickness. This work, of course, would show the average manganese content.

Another drill would drill in the present known heart of the area for the primary purpose of extracting core for determining the nature of the material.

In addition to the operation of drilling, samples would be taken to our sample house at Ironton and prepared and filed in the usual manner, assays being obtained from the Lerch Brothers laboratory in Crosby. At this stage the samples would thus be available for examination and for preparation for testing.

The drilling would naturally be guided from an engineering standpoint by the results being currently obtained and sufficient geological services would be made available so that the geology would be studied concurrently with the drilling and naturally as a guide thereto.

As to tests, various possible methods would be investigated and tried out and metallurgical advice and facilities would be made available for this phase of work.

It would not be intended to drill out this formation to its uttermost limits; that would be too long and expensive and unwarranted at this stage. But while endeavoring to learn by the only present available method (testing drill cores) whether the material can be metallurgically and economically handled, it is, of course, equally important to find that there is a sufficiently large and continuous ore body containing sufficient manganese. Hence, the drilling program is for two purposes.

If this drilling program, together with the geological and metallurgical studies, demonstrated a worthwhile source of manganese units, then it would be reasonable to assume that the necessary development would follow.

The proposed investment would of course not permit any development. It would probably be inadequate for a

complete exploration of the whole area but that is not necessary at this stage. It should be enough to cover sufficient drilling for the uses noted and sufficient technical studies to demonstrate whether the area warrants further development.

As to the qualifications of Adams Brothers Company, in 1949 Robert M. Adams formed this company to take over his new mining business in Minnesota and carry on his further explorations.

Cuyler Adams discovered the Cuyuna Range about 1905, and the Adams family has been actively associated with the exploration and development of the Range ever since.

Robert M. Adams started exploring on the Range in 1915 and has continued from that time. The following properties resulted from his work:

Maroco Mine
Evergreen Mine and Smelting plant
Hillcrest Group (Hillcrest, Arko and Alstead)
Mangan-Louise Group
Rabbit Lake Group
Virginia

THIS AGREEMENT, Made this 1st day of August, 1949, by and between GEORGE E. WHITFORD and DENORA ALMA WHITFORD, his wife, of Carrington, North Dakota, Parties of the First Part, Lessors, and ROBERT M. ADAMS, of Duluth, Minnesota, Party of the Second Part, Lessee,

W I T N E S S E T H :

I. That the Lessors, in consideration of the sum of One Dollar ($1.00) to them in hand paid by the Lessee, the receipt whereof is hereby acknowledged, and in further consideration of the covenants and conditions herein contained to be kept and performed by the Lessee, do hereby let, lease and demise to the Lessee, for the term of fifty (50) years from and after the date hereof, the following described lands and premises situated in the County of Crow Wing and State of Minnesota, viz:

> All of the surface and an undivided one-half (½) interest in the minerals in the Northwest Quarter (NW¼) in Section Twenty-nine (29), Township Forty-seven (47) north, Range Twenty-nine (29) west, according to the United States Government survey thereof;

which premises are leased to the Lessee for the purposes of exploring for, mining, taking out and removing therefrom the iron, manganese and manganiferous ore which is or which hereafter may be found on, in or under said lands, together with the right to construct all buildings, make all excavations, openings, ditches, drains, railroad and wagon roads and other improvements upon said premises, which are or may become necessary or suitable for the mining and removing of iron, manganese and manganiferous ore from said premises; provided, however, that the Lessee shall have the right at any time to terminate this agreement by giving sixty

(60) days' written notice to the Lessors by mail, and in case notice is given it may be addressed to the said Lessors or others having their estate in the premises at the place or places, respectively, at which royalty is for the time being payable hereunder, and thereupon the foregoing lease and demise shall terminate, and all arrearages and sums which may be due under the same up to and including the date of its determination as set forth in such notice shall be paid upon settlement and adjustment thereof. The Lessors further agree that the Lessee shall have the right, under this agreement, to contract with others to work such mine or mines, or any part thereof or to sub-contract the same, and the use of said land or any part thereof for the purpose of mining iron, manganese and manganiferous ore, with the same rights and privileges as are herein granted to the said Lessee, and that the uninterrupted right of the Lessee to take, use and carry away the iron, manganese and manganiferous ore herein provided for shall continue unsuspended, notwithstanding any disagreement between the parties hereto respecting the same or this contract, provided he shall duly pay for all ore taken or agreed to be taken at the time or times and in the manner stipulated in and by this contract.

In case the premises leased hereby shall be mined and operated by the Lessee in connection with other adjoining property not covered hereby, the Lessee shall have the right to use said demised premises for proper ingress and egress to and from said adjoining properties by railroad tracks, wagon roads, pole lines, launders, pipe lines, etc., and shall have the right to handle all such property as one unit in the proper operation thereof, mining through one property to another, provided, always that the ore mined from the demised premises shall be kept separate and apart

and separately accounted for in accordance herewith.

II. The Lessee, in consideration of the premises, hereby covenants and agrees to and with the Lessors, that the Lessee will on the 20th days of January, April, July and October or on the day ensuing if that day falls on Sunday, in each year during the period hereinbefore stipulated, or during the period this contract continues in force, commencing with October 20, 1949, pay to or for the use of the Lessors, at such bank or banks in any city of the United States as the Lessors or their successors in interest may from time to time in writing designate, for all the iron, manganese and manganiferous ore mined and removed from said lands during the three months preceding the first of the month in which payment is to be made as aforesaid, at the rate of twenty-five cents (25¢) per ton, or twelve and one-half cents (12½¢) per ton on the Lessors' interest, each ton to be reckoned at two thousand two hundred forty (2240) pounds; such payments to be made to the said Lessors, their respective successors or assigns, in proportion to their respective interests in said lands above described. Lessee at the time of such payment, shall transmit to the Lessors an exact and truthful statement of the amount of ore removed during the three months for which payments shall be made. The ores so taken by the Lessee from the said land, shall be weighed by the railway company transporting the same from the said land, which weights shall prima facie determine the quantity as between the parties hereto, but if said ore is delivered by the Lessee to the buyer thereof on the Cuyuna Range, weights of a standard Merrick weightometer which shall at all times be open to the inspection of the Lessors shall be accepted in lieu of railway weights. Said Lessee shall furnish the Lessors monthly

statements showing the aforesaid weights, the right, however, being hereby conceded to the Lessors, to inspect, review and test the correctness of said railway company's scales or the local buyer's weightometer and weights at any time and in such manner as the Lessors may see fit to adopt, it being understood that any errors in this respect, when ascertained, shall be recognized and corrected in their accounts.

Should any ore be removed from the premises to lands adjoining for the purpose of washing or otherwise treating the same to make it merchantable, in accordance with the subsequent provisions herein contained, the Lessee will, during the life of the lease, furnish to the Lessors monthly sworn statements showing how much ore has been so removed for that purpose the previous month, together with assays thereof, and also the quantity of ore washed, screened, dried or otherwise treated, during such previous month.

If the lessee should cancel this lease, as heretofore provided, he shall pay royalty on all ore so removed, whether the same has actually been washed, screened, dried or otherwise treated, or not.

III. The Lessee further covenants to pay all taxes and assessments, ordinary and extraordinary, general or specific, which may be levied or assessed against the Lessors' interest upon the demised lands and upon the whole thereof, and on the iron, manganese and manganiferous ore mined thereon, and all improvements and personal property thereon, while this lease shall continue in force, and to furnish the Lessors with duplicate tax receipts showing the payment of all such assessments, or taxes; provided,

however, that the Lessee shall always have the right to contest in the courts or otherwise, the validity of any such taxes or assessments in case he shall deem the same unlawful, unjust, unequal or excessive, or to take such other steps or proceedings as he may deem necessary to secure a cancelation, reduction, re-adjustment, or equalization thereof, before he shall be required to pay and discharge the same or any part thereof; but provided, further, that the Lessee shall not permit or suffer any lands and premises, or any part thereof, to be sold at any time for any taxes or assessments. And upon the termination of this lease by surrender or otherwise, as herein provided, the Lessee will peaceably surrender possession of said lands and the whole thereof to the Lessors, and said taxes levied and assessed for the year in which such termination shall become effective as to the whole of said premises or as to any government sub-division shall be prorated so that the Lessee shall be liable for the proportion of said taxes for said year as is represented by the portion of said time during which the Lessee held said surrendered premises.

IV. The Lessee further covenants and agrees that he will mine and ship from said lands, or pay royalty thereon to Lessors at the rate of twelve and one-half cents (12½¢) per ton, two thousand (2,000) gross tons as an annual agreed minimum output until April 1, 1952, and that from and after April 1, 1952, the annual minimum output shall be ten thousand (10,000) tons as long as this lease shall remain in effect. If in any one or more years while this lease shall remain in force the Lessee shall not actually ship from said lands the full quantity of the said agreed minimum output, the Lessee will nevertheless pay to the Lessors minimum or advance

royalty as hereinafter provided, in addition to the royalty paid for iron, manganese and manganiferous ore actually shipped during that year, such sum as shall, together with the amount paid as royalty for iron, manganese and manganiferous ore actually shipped during said year, amount to the minimum royalty payment required for that year. Said advance or minimum royalty shall be paid in equal quarterly installments upon the quarter days and in the manner herein provided for the payment of royalty on ore actually shipped. If in any quarter year the Lessee shall ship a quantity of iron, manganese and manganiferous ore in excess of one-fourth (¼) of the agreed minimum output for that year, the royalty on all such ore in excess of one-fourth (¼) of such annual minimum output may be satisfied, so far as the royalty on such excess will apply, by the application of any advance or minimum royalty ever theretofore paid under this lease and for which no ore has been actually shipped and of which no previous application has actually been made; and any royalty actually paid upon ore shipped in any quarter of any calendar year in excess of one-fourth (¼) of the agreed minimum output for that year shall be in discharge, so far as the royalty on such excess will apply, of the obligation to pay advance or minimum royalty for any subsequent quarter or quarters of such calendar year. The obligation of the Lessee to pay advance or minimum royalties as aforesaid shall continue in force without regard to the quantity or quality of the iron, manganese and manganiferous ore existing on said land during the full term of this lease or until the same shall be determined or surrendered or assigned in the manner herein provided; and in case of an assignment of said lease the obligation to mine

ore or make such agreed yearly minimum royalty payment, as well as all other provisions of the lease shall bind the assignee as fully as the Lessee is bound hereby.

V. It is mutually understood and agreed that upon the termination of this agreement, whether by acts or the parties or by limitation, the Lessee shall have ninety (90) days in which to remove all engines, tools, machinery, railroad tracks and structures erected or placed by said Lessee on said lands, but shall not remove or impair any supports placed in the mines, nor any timbers or frameworks necessary to the use and maintenance of the shafts or other approaches to the mines, nor any tramways within the mines.

VI. The Lessee shall open, use and work said mines in such manner only as is usual and customary in the skillful and proper mining operations of similar character when conducted by the proprietors themselves, so as not to do, cause or permit any unnecessary or unusual permanent injury to the same, or inconvenience or hindrance in the subsequent operating of the same mine or mines; and in the working of said mine or mines the Lessee shall deposit all earth, overburden, rocks and other useless material or rubbish at such places and in such manner as will not conflict with or embarrass the future operating of said mines, and so long as such condition is complied with the Lessee shall have the right to deposit waste or overburden from adjoining properties operated by the Lessee in connection with the demised premises upon said demised premises, provided that in advance of dumping upon any such area the engineers of both parties agree upon any necessary drilling that might be needed in addition to that that might be

already done to prove such area as negative; that such drilling be done by the Lessee and such area or areas reasonably proven not to contain open pit ore, which, all factors considered, would be merchantable; and provided, further, that for any waste from adjoining premises deposited upon the demised premises a like amount of waste from the demised premises shall be deposited elsewhere within two years from the date of such deposit or dumping, so that no greater amount of waste shall be deposited upon the demised premises than would have resulted had the demised premises been operated alone; and provided, further, that no notice of cancellation of lease shall be effective until this clause has been complied with and such dumping equalized as between the demised premises and adjoining properties.

VII. The Lessors expressly reserve for themselves (and the parties hereto agree that the Lessors shall have) the right, by their agents or servants, to enter into and upon the above demised premises, and any part or parts thereof, at any time or times, to inspect and survey the same and measure the quantity of ores that shall have been mined or removed therefrom, not unnecessarily or unreasonably hindering or interfering with the work or operations of the Lessee.

The Lessee shall and will furnish the Lessors monthly reports of all explorations carried on by means of drills from the surface, including blue prints showing location of all drill holes thereon, also analyses of all iron found therein; and will furnish Lessors annually, mine maps showing all drifts, crosscuts and openings in any mine or mines opened and worked on the premises.

The covenants, terms and conditions of this lease shall run with the land and be in all respects binding and operative on all sublessees and assignees under the said Lessee but this lease shall not be assigned by the Lessee, except to reputable and responsible parties.

VIII. The Lessee agrees that when this lease shall for any cause terminate he will enter or cause to be entered a certificate of that fact upon the proper book of record in the county where the land is situated, provided this lease shall have been recorded there.

IX. This lease is granted and accepted upon condition that if the royalty hereby reserved, or any part thereof, be and remain unpaid after the days and times above specified, or the Lessee shall fail to keep any of the covenants or conditions herein expressed to be kept and performed by him, and if any such failure or failures in payments or otherwise shall continue for sixty (60) days after the receipt by him of written notice from the Lessors, specifying the default, neglect and failure complained of, then, and from thenceforth, and in either of said events, but not otherwise, it shall be lawful for the Lessors, at their option, to take possession of the said leased premises with or without any previous process whatever, to re-enter and have and possess the same as fully as if no lease had been given to the Lessee, and the said Lessee and all parties claiming under him shall be wholly excluded therefrom, and this lease shall become and be wholly void and at an end and subject to the provisions of Paragraph V hereof.

X. It is understood that the Lessors reserve, and shall

at all times have, possess and hold a lien upon all ore mined and all improvements made on said premises by the Lessee as security for any unpaid balances of money due under this contract, whether for royalties, taxes or otherwise, such balances being deemed to be treated as balances of purchase money, and which lien may be enforced against such property in like manner as liens conferred by chattel mortgages are or may be entitled to be enforced under the laws of the State of Minnesota.

XI. The Lessee covenants that while this lease shall remain in force and until it is surrendered or assigned, as in manner herein provided, he will protect the said land and the improvements and iron ore in stockpile thereon from all mechanics' and laborers' liens and keep the title to the same free and clear from all clouds or encumbrances arising from such liens in any way caused by his mining operations thereon or the use and occupation thereof by the Lessee, his agents, servants, employees or contractors.

XII. If, in any of said mining operations, ore shall be encountered which shall not then be merchantable in its natural condition, the Lessee shall have the right, at his option, to wash, dry, screen, sinter, agglomerate, or otherwise treat the same in order to make it merchantable, and the royalties shall accrue on such product or concentrate and not upon the crude ore before such treatment.

Such treatment of the ore in order to make it merchantable may be conducted by the Lessee either on the lands hereby

demised or on other lands adjoining or in the vicinity available for the installation of a plant adapted to such purpose; provided, that the Lessee shall first obtain the fee or a lease of such other lands in such manner that the lien and rights of the Lessors herein shall be fully preserved and protected as to any ore removed thereto, to the same extent as though it remained on the land herein demised. The removal of such ore from the demised premises to any other lands, for the purpose of treating the same, shall not be deemed to be a mining and removal from the demised premises so as to cause the royalty herein provided for to accrue thereon, until the ore product or concentrate of such treatment shall be actually shipped and weighed by the railroad company transporting the same.

In the event of said ore being treated on lands other than the demised premises, it shall be treated separately and apart from all other ores and separately loaded on railroad cars for transportation, and separately weighed, and all of said operations shall be conducted and completed within a reasonable length of time.

In case such plant is erected on the demised premises, the Lessee agrees that any refuse or waste arising from such treatment shall be so deposited as to not interfere with the future operation of any mine or mines on the demised premises.

In the event that said second party or his assigns desires to treat ore from other properties operated by him or his assigns in the vicinity in a plant erected on said demised premises,

it is hereby agreed that the second party or his assigns shall have the right, power, use and authority to treat said other ores upon the property of the first parties herein demised, provided that all waste, refuse and unused materials from said washing operations of ore from other property shall be deposited outside and beyond the limits of the property of the first parties. The intention being that no greater amount of waste or refuse or unused material shall be left or deposited upon the demised premises than would result from the washing of the ore from said demised premises, and it is further agreed by the parties hereto that the party of the second part shall take all reasonable steps required by the parties of the first part for keeping a separate account of the ore mined from the demised premises from the ore washed from other properties, and all expenses connected with such operations shall be borne by the party of the second part, and said washing plant shall be entirely clean of ore of the parties of the first part before starting to wash the ores from other properties.

The Lessee further agrees to conduct the washing, screening, drying or other treatment in a good and workmanlike manner according to good engineering practice and so as not to cause any greater waste of such ore than is necessary to render the ore product or concentrate thereof merchantable and of proper composition and character for successful and economical furnace use, and that he will use in any such treatment proper machinery and appliances to that end.

XIII. The Lessors hereby represent and covenant with the Lessee that they are at the time of the execution and delivery

hereof well seized in fee of said surface and one-half (½) interest in said minerals by good, perfect and indefeasible title thereto; that the said land is free from all liens and encumbrances, and that they have the right to lease the same in manner as in this lease provided, and the Lessee in the quiet and peaceable possession of said land, as Lessee, for the purpose of this lease provided, they will to the extent of their respective interests forever warrant and defend against all lawful claims or demands whatsoever, save and except only such claims or demands as may be created by the Lessee, or exist by virtue of his acts or omissions.

XIV. Arbitration Clause. In case any disagreement or controversy shall arise between the parties hereto relative to the observance or fulfillment of the terms and obligations hereof by either party, then such controversy or disagreement shall be determined by arbitration. Either party may within thirty (30) days after such disagreement arises, demand arbitration thereof, and the party or parties making such demand shall in writing specify the matter to be submitted to arbitration and at the same time choose and nominate some disinterested competent person to act as an arbitrator; thereupon, within ten (10) days after receipt of such written notice, the other party to this lease shall in writing choose and nominate a disinterested and competent arbitrator and the two arbitrators so chosen shall forthwith select a third arbitrator, giving written notice to both parties of the choice so made and fixing a place and time for meeting not later than thirty (30) days thereafter, at which both parties may appear and be heard touching such controversy. The decision of said arbitrators shall be made in writing within thirty (30) days after the

completion of hearings thereon, and when signed by a majority of them shall be final and conclusive upon both parties and the award so made shall be forthwith complied with. In case the notified party shall neglect or refuse to choose and nominate an arbitrator as above provided and within the time hereinabove specified, then the party demanding arbitration shall have the right to name the second arbitrator. In case the two chosen by either of the above methods shall fail to agree upon a third arbitrator and give notice as herein provided, such third arbitrator shall, upon the application of either party, be named by the person who may then be holding the office of Judge of the United States District Court in and for the district in which Duluth, Minnesota, is located, or the person holding an office which corresponds to such office as now extant if it shall then have been abolished.

The expense of any such arbitration, including reasonable compensation for the arbitrators shall be paid by the party against which the award therein shall be made, or as otherwise determined by the arbitrators.

XV. Notwithstanding any of the other provisions herein contained, whenever it is necessary to serve upon or deliver to the parties to this lease any written notice, periodical report, statement or other instrument, the same shall be sent by registered mail addressed to the parties at the following addresses, respectively, or to such other addresses as they may specify to each other in writing, viz.:

If to Lessors: George E. Whitford
Carrington, North Dakota

If to Lessee: Robert M. Adams
Duluth 2, Minnesota

XVI. It is further mutually agreed that all the grants, stipulations and conditions herein expressed shall apply to and bind the successors, heirs, executors, administrators and assigns (as the case may be) of the said respective parties.

IN WITNESS WHEREOF, this instrument has been executed by the parties hereto as of the day and the year first above written.

Signed and acknowledged
in the presence of:

/s/ C. W. Burnham

/s/ Lucille Burnham
As to George E. Whitford and
Denora Alma Whitford

/s/ George E. Whitford
George E. Whitford

/s/ Denora Alma Whitford
Denora Alma Whitford

FIRST PARTIES

/s/ R. O. Lee

/s/ Cherrill W. Adams
As to Robert M. Adams

/s/ Robert M. Adams
Robert M. Adams

SECOND PARTY

AMENDMENTS TO LEASE AGREEMENT

IT IS UNDERSTOOD THAT the within Section XVII and Section XVIII are additional sections to the hereunto attached lease made and entered into between George E. Whitford and Denora Alma Whitford, his wife and Robert A. Adams, dated on the 1st day of August A. D., 1949, and are to have the same force and effect as if they were fully incorporated and set forth in the body of said lease with the same section numbers, and are as follows, to-wit:

SECTION XVII. That nothing contained in said lease shall in any manner whatsoever effect or contradict or be in conflict with the provisions of that certain easement made and entered into by and between the said George E. Whitford and Denora Alma Whitford, his wife, and the Minnesota Power & Light Company, which said easement grants to said company the perpetual right, privilege and easement to construct, maintain and operate an electric transmission line, with the necessary poles, cross-arms, guy, braces, wires and appurtenances, across the real estate in said lease described, said easement being dated December 20, 1948.

SECTION XVIII. That the Lessors in said lease reserve unto themselves all growing timber on said land, and that the said lessee shall not cut or destroy any growing timber thereon, except any such as may interfere with the operation of any mining done on said land.

Dated August 1, 1949

/s/ George E. Whitford

/s/ Denora Alma Whitford
Lessors

/s/ Robert M. Adams
Lessee

STATE OF NORTH DAKOTA)
) ss
COUNTY OF FOSTER)

On this 1st day of August, 1949, before me, a Notary Public, personally appeared GEORGE E. WHITFORD and DENORA ALMA WHITFORD, his wife, to me known to be the persons described in and who executed the foregoing instrument, and acknowledged that they executed the same as their free act and deed.

/s/ C. W. Burnham
Notary Public

My commission expires 10-25-51.

STATE OF MINNESOTA)
) ss
COUNTY OF CROW WING)

On this 26th day of August, 1949, before me, a Notary Public, personally appeared ROBERT M. ADAMS, to me known to be the person described in and who executed the foregoing instrument, and acknowledged that he executed the same as his free act and deed.

/s/ H. O. Lee
Notary Public

My commission expires 4-14-54

THIS AGREEMENT, Made this 1st day of June, 1949, by and between AGNES LOUISE DEAN, HELEN DEAN BOGAN, CAROLYN E. DEAN, as Executors of the Estate of ALFRED J. DEAN, Deceased, Parties of the First Part, Lessors, and ROBERT M. ADAMS, of Duluth, Minnesota, Party of the Second Part,

W I T N E S S E T H :

I. That the Lessors, in consideration of the sum of One Dollar ($1.00) to them in hand paid by the Lessee, the receipt whereof is hereby acknowledged, and in further consideration of the covenants and conditions herein contained to be kept and performed by the Lessee, do hereby let, lease and demise to the Lessee, for the term of fifty (50) years from and after the date hereof, the following described lands and premises situated in the County of Crow Wing and State of Minnesota, viz:

> An Undivided One-half (½) interest in the minerals in the Northwest Quarter (NW¼) in Section Twenty-nine, (29), Township Forty-seven (47) north, Range Twenty-nine (29) west, according to the United States Government survey thereof;

which premises are leased to the Lessee for the purposes of exploring for, mining, taking out and removing therefrom the iron, manganese and manganiferous ore which is or which hereafter may be found on, in or under said lands, together with the right to construct all buildings, make all excavations, openings, ditches, drains, railroad and wagon roads and other improvements upon said premises, which are or may become necessary or suitable for the mining and removing of iron, manganese and manganiferous ore from said premises; provided, however, that the Lessee shall have the

right at any time to terminate this agreement by giving sixty (60) days written notice to the Lessors by mail and in case notice is given it may be addressed to the said Lessors (or others having their estate in the premises) at the place (or places, respectively,) at which royalty is for the time being payable hereunder, and thereupon the foregoing lease and demise shall terminate, and all arrearages and sums which may be due under the same up to and including the date of its determination as set forth in such notice shall be paid upon settlement and adjustment thereof. The Lessors further agree that the Lessee shall have the right, under this agreement, to contract with others to work such mine or mines, or any part thereof or to sub-contract the same, and the use of said land or any part thereof for the purpose of mining iron, manganese and manganiferous ore, with the same rights and priviliges as are herein granted to the said Lessee, and that the uninterrupted right of the Lessee to take, use and carry away the iron, manganese and manganiferous ore herein provided for shall continue unsuspended, notwithstanding any disagreement between the parties hereto respecting the same or this contract, provided he shall duly pay for all ore taken or agreed to be taken at the time or times and in the manner stipulated in and by t is contract.

In case the premises leased hereby shall be mined and operated by the Lessee in connection with other adjoining property not covered hereby, the Lessee shall have the right to use said demised premises for proper ingress and egress to and from said adjoining properties by railroad tracks, wagon roads, pole lines, launders, pipe lines, etc., and shall have the right to

handle all such property as one unit in the proper operation thereof, mining through one property to another, provided, always that the ore mined from the demised premises shall be kept separate and apart and separately accounted for in accordance herewith.

II. The Lessee, in consideration of the premises, hereby covenants and agrees to and with the Lessors, that the Lessee will on the 20th days of January, April, July and October or on the day ensuing if that day falls on Sunday, in each year during the period hereinbefore stipulated, or during the period this contract continues in force, commencing with October 20, 1949, pay to or for the use of the Lessors, at such bank or banks in any city of the United States as the Lessors or their successors in interest may from time to time in writing designate, for all the iron, manganese and manganiferous ore mined and removed from said lands during the three months preceding the first of the month in which payment is to be made as aforesaid, at the rate of twenty-five cents (25¢) per ton, or twelve and one-half cents (12½¢) per ton on the Lessors one-half (½) interest, each ton to be reckoned at two thousand two hundred forty (2240) pounds; such payments to be made to the said Lessors, their respective successors or assigns, in proportion to their respective interests in said lands above described. Lessee at the time of such payment, shall transmit to the Lessors an exact and truthful statement of the amount of ore removed during the three months for which payments shall be made. The ores so taken by the Lessee from the said land, shall be weighed by the railway company transporting the same from the said land, which weights shall prima facie determine the quantity as

between the parties hereto, but if said ore is delivered by the Lessee to the buyer thereof on the Cuyuna Range, weights of a standard Merrick weightometer which shall at all times be open to the inspection of the Lessors shall be accepted in lieu of railway weights. Said Lessee shall furnish the Lessors monthly statements showing the aforesaid weights, the right, however, being hereby conceded to the Lessors, to inspect, review and test the correctness of said railway company's scales or the local buyer's weightometer and weights at any time and in such manner as the Lessors may see fit to adopt, it being understood that any errors in this respect, when ascertained, shall be recognized and corrected in their accounts.

Should any ore be removed from the premises to lands adjoining for the purpose of washing or otherwise treating the same to make it merchantable, in accordance with the subsequent provisions herein contained, the Lessee will, during the life of the lease, furnish to the Lessors monthly sworn statements showing how much ore has been so removed for that purpose the previous month, together with assays thereof, and also the quantity of ore washed, screened, dried or otherwise treated, during such previous month.

If the Lessee should cancel this lease, as heretofore provided, he shall pay royalty on all ore so removed, whether the same has actually been washed, screened, dried or otherwise treated, or not.

III. The Lessee further covenants to pay all taxes and assessments, ordinary and extraordinary, general or specific, which may be levied or assessed against the Lessors' one-half (½) interest

upon the demised lands and upon the whole thereof, and on the iron, manganese and manganiferous ore mined thereon, and all improvements and personal property thereon, while this lease shall continue in force, and to furnish the Lessors with duplicate tax receipts showing the payment of all such assessments, or taxes; provided, however, that the Lessee shall always have the right to contest in the courts or otherwise, the validity of any such taxes or assessments in case he shall deem the same unlawful, unjust, unequal or excessive, or to take such other steps or proceedings as he may deem necessary to secure a cancelation, reduction, re-adjustment, or equalization thereof, before he shall be required to pay and discharge the same or any part thereof; but provided, further, that the Lessee shall not permit or suffer any lands and premises, or any part thereof, to be sold at any time for any taxes or assessments. And upon the termination of this lease by surrender or otherwise, as herein provided, the Lessee will peaceably surrender possession of said lands and the whole thereof to the Lessors, and said taxes levied and assessed for the year in which such termination shall become effective as to the whole of said premises or as to any government sub-division shall be pro rated so that the Lessee shall be liable for the proportion of said taxes for said year as is represented by the portion of said time during which the Lessee held said surrendered premises.

IV. The Lessee further covenants and agrees that he will mine and ship from said lands, or pay royalty thereon to Lessors at the rate of twelve and one-half cents (12½¢) per ton, two thousand (2,000) gross tons as an annual agreed minimum output until April 1, 1952, and that from and after April 1, 1952, the annual minimum output shall be ten thousand (10,000) tons as long as this lease

shall remain in effect. If in any one or more years while this lease shall remain in force the Lessee shall not actually ship from said lands the full quantity of the said agreed minimum output, the Lessee will nevertheless pay to the Lessors minimum or advance royalty as hereinafter provided, in addition to the royalty paid for iron, manganese and manganiferous ore actually shipped during that year, such sum as shall, together with the amount paid as royalty for iron, manganese and manganiferous ore actually shipped during said year, amount to the minimum royalty payment required for that year. Said advance or minimum royalty shall be paid in equal quarterly installments upon the quarter days and in the manner herein provided for the payment of royalty on ore actually shipped. If in any quarter year the Lessee shall ship a quantity of iron, manganese and manganiferous ore in excess of one-fourth (¼) of the agreed minimum output for that year, the royalty on all such ore in excess of one-fourth (¼) of such annual minimum output may be satisfied, so far as the royalty on such excess will apply, by the application of any advance or minimum royalty ever theretofore paid under this lease and for which no ore has been actually shipped and of which no previous application has actually been made; and any royalty actually paid upon ore shipped in any quarter of any calendar year in excess of one-fourth (¼) of the agreed minimum output for that year shall be in discharge, so far as the royalty on such excess will apply, of the obligation to pay advance or minimum royalty for any subsequent quarter or quarters of such calendar year. The obligation of the Lessee to pay advance or minimum royalties as aforesaid shall continue in force without regard to the quantity or quality of the iron, manganese and man-

ganiferous ore existing on said land during the full term of this lease or until the same shall be determined or surrendered or assigned in the manner herein provided; and in case of an assignment of said lease the obligation to mine ore or make such agreed yearly minimum royalty payment, as well as all other provisions of the lease shall bind the assignee as fully as the Lessee is bound hereby.

V. It is mutually understood and agreed that upon the termination of this agreement, whether by acts of the parties or by limitation, the Lessee shall have ninety (90) days in which to remove all engines, tools, machinery, railroad tracks and structures erected or placed by said Lessee on said lands, but shall not remove or impair any supports placed in the mines, nor any timbers or frameworks necessary to the use and maintenance of the shafts or other approaches to the mines, nor any tramways within the mines.

VI. The Lessee shall open, use and work said mines in such manner only as is usual and customary in the skillful and proper mining operations of similar character when conducted by the proprietors themselves, so as not to do, cause or permit any unnecessary or unusual permanent injury to the same, or inconvenience or hindrance in the subsequent operating of the same mine or mines; and in the working of said mine or mines the Lessee shall deposit all earth, overburden, rocks and other useless material or rubbish at such places and in such manner as will not conflict with or embarrass the future operating of said mines, and so long as such condition is complied with the Lessee shall have the right

to deposit waste or overburden from adjoining properties operated by the Lessee in connection with the demised premises upon said demised premises, provided that in advance of dumping upon any such area the engineers of both parties agree upon any necessary drilling that might be needed in addition to that that might be already done to prove such area as negative; that such drilling be done by the Lessee and such area or areas reasonably proven not to contain open pit ore, which, all factors considered, would be merchantable; and provided, further, that for any waste from adjoining premises deposited upon the demised premises a like amount of waste from the demised premises shall be deposited elsewhere within two years from the date of such deposit or dumping, so that no greater amount of waste shall be deposited upon the demised premises than would have resulted had the demised premises been operated alone; and provided, further, that no notice of cancellation of lease shall be effective until this clause has been complied with and such dumping equalized as between the demised premises and adjoining properties.

VII. The Lessors expressly reserve for themselves (and the parties hereto agree that the Lessors shall have) the right, by their agents or servants, to enter into and upon the above demised premises, and any part or parts thereof, at any time or times, to inspect and survey the same and measure the quantity of ores that shall have been mined or removed therefrom, not unnecessarily or unreasonably hindering or interfering with the work or operations of the Lessee.

The lessee shall and will furnish the Lessors monthly reports of all explorations carried on by means of drills from

the surface, including blue prints showing location of all drill holes thereon, also analyses of all iron found therein; and will furnish Lessors annually, mine maps showing all drifts, crosscuts and openings in any mine or mines opened and worked on the premises.

The covenants, terms and conditions of this lease shall run with the land and be in all respects binding and operative on all sublessees and assignees under the said Lessee but this lease shall not be assigned by the Lessee, except to reputable and responsible parties.

VIII. The Lessee agrees that when this lease shall for any cause terminate he will enter or cause to be entered a certificate of that fact upon the proper book of record in the county where the land is situated, provided this lease shall have been recorded there.

IX. This lease is granted and accepted upon condition that if the royalty hereby reserved, or any part thereof, be and remain unpaid after the days and times above specified, or the Lessee shall fail to keep any of the covenants or conditions herein expressed to be kept and performed by him, and if any such failure or failures in payments or otherwise shall continue for sixty (60) days after the receipt by him of written notice from the Lessors, specifying the default, neglect and failure complained of, then, and from thenceforth, and in either of said events, but not otherwise, it shall be lawful for the Lessors, at their option, to take possession of the said leased premises with or without any previous process whatever, to re-enter and have and possess the

same as fully as if no lease had been given to the Lessee, and the said Lessee and all parties claiming under him shall be wholly excluded therefrom, and this lease shall become and be wholly void and at an end and subject to the provisions of Paragraph V hereof.

X. It is understood that the Lessors reserve, and shall at all times have, possess and hold a lien upon all ore mined and all improvements made on said premises by the Lessee as security for any unpaid balances of money due under this contract, whether for royalties, taxes or otherwise, such balances being deemed to be treated as balances of purchase money, and which lien may be enforced against such property in like manner as liens conferred by chattel mortgages are or may be entitled to be enforced under the laws of the State of Minnesota.

XI. The Lessee covenants that while this lease shall remain in force and until it is surrendered or assigned, as in manner herein provided, he will protect the said land and the improvements and iron ore in stockpile thereon from all mechanics' and laborers' liens and keep the title to the same free and clear from all clouds or encumbrances arising from such liens in any way caused by his mining operations thereon or the use and occupation thereof by the Lessee, his agents, servants, employees or contractors.

XII. If, in any of said mining operations, ore shall be encountered which shall not then be merchantable in its natural condition, the Lessee shall have the right, at his option, to wash, dry, screen, sinter, agglomerate, or otherwise treat the same in order to make it merchantable, and the royalties shall accrue on

such product or concentrate and not upon the crude ore before such treatment.

Such treatment of the ore in order to make it merchantable may be conducted by the Lessee either on the lands hereby demised or on other lands adjoining or in the vicinity available for the installation of a plant adapted to such purpose; provided, that the Lessee shall first obtain the fee or a lease of such other lands in such manner that the lien and rights of the Lessors herein shall be fully preserved and protected as to any ore removed thereto, to the same extent as though it remained on the land herein demised. The removal of such ore from the demised premises to any other lands, for the purpose of treating the same, shall not be deemed to be a mining and removal from the demised premises so as to cause the royalty herein provided for to accrue thereon, until the ore product or concentrate of such treatment shall be actually shipped and weighed by the railroad company transporting the same.

In the event of said ore being treated on lands other than the demised premises, it shall be treated separately and apart from all other ores and separately loaded on railroad cars for transportation, and separately weighed, and all of said operations shall be conducted and completed within a reasonable length of time.

In case such plant is erected on the demised premises, the Lessee agrees that any refuse or waste arising from such treatment shall be so deposited as to not interfere with the future operation of any mine or mines on the demised premises.

In the event that said second party or his assigns des-

ires to treat ore from other properties operated by him or his assigns in the vicinity in a plant erected on said demised premises, it is hereby agreed that the second party or his assigns shall have the right, power, use and authority to treat said other ores upon the property of the first parties herein demised, provided that all waste, refuse and unused materials from said washing operations of ore from other property shall be deposited outside and beyond the limits of the property of the first parties. The intention being that no greater amount of waste or refuse or unused material shall be left or deposited upon the demised premises than would result from the washing of the ore from said demised premises, and it is further agreed by the parties hereto that the party of the second part shall take all reasonable steps required by the parties of the first part for keeping a separate account of the ore mined from the demised premises from the ore washed from other properties, and all expenses connected with such operations shall be borne by the party of the second part, and said washing plant shall be entirely clean of ore of the parties of the first part before starting to wash the ores from other properties.

The Lessee further agrees to conduct the washing, screening drying or other treatment in a good and workmanlike manner according to good engineering practice and so as not to cause any greater waste of such ore than is necessary to render the ore product or concentrate thereof merchantable and of proper composition and character for successful and economical furnace use, and that he will use in any such treatment proper machinery and appliances to that end.

XIII. The Lessors hereby represent and covenant with the Lessee that they are at the time of the execution and delivery hereof well seized in fee of said one-half (½) interest in said minerals by good, perfect and indefeasible title thereto; that the said land is free from all liens and encumbrances, and that they have the right to lease the same in manner as in this lease provided, and the Lessee in the quiet and peaceable possession of said land, as Lessee, for the purpose of this lease provided, they will to the extent of their respective interests forever warrant and defend against all lawful claims or demands whatsoever, save and except only such claims or demands as may be created by the Lessee, or exist by virtue of his acts or omissions.

XIV. Arbitration Clause. In case any disagreement or controversy shall arise between the parties hereto relative to the observance or fulfillment of the terms and obligations hereof by either party, then such controversy or disagreement shall be determined by arbitration. Either party may within thirty (30) days after such disagreement arises, demand arbitration thereof, and the party or parties making such demand shall in writing specify the matter to be submitted to arbitration and at the same time choose and nominate some disinterested competent person to act as an arbitrator; thereupon, within ten (10) days after receipt of such written notice, the other party to this lease shall in writing choose and nominate a disinterested and competent arbitrator and the two arbitrators so chosen shall forthwith select a third arbitrator, giving written notice to both parties of

the choice so made and fixing a place and time for meeting not later than thirty (30) days thereafter, at which both parties may appear and be heard touching such controversy. The decision of said arbitrators shall be made in writing within thirty (30) days after the completion of hearings thereon, and when signed by a majority of them shall be final and conclusive upon both parties and the award so made shall be forthwith complied with. In case the notified party shall neglect or refuse to choose and nominate an arbitrator as above provided and within the time hereinabove specified, then the party demanding arbitration shall have the right to name the second arbitrator. In case the two chosen by either of the above methods shall fail to agree upon a third arbitrator and give notice as herein provided, such third arbitrator shall, upon the application of either party, be named by the person who may then be holding the office of Judge of the United States District Court in and for the district in which Duluth, Minnesota, is located, or the person holding an office which corresponds to such office as now extant if it shall then have been abolished.

The expense of any such arbitration, including reasonable compensation for the arbitrators shall be paid by the party against which the award therein shall be made, or as otherwise determined by the arbitrators.

XV. Notwithstanding any of the other provisions herein contained, whenever it is necessary to serve upon or deliver to the parties to this lease any written notice, periodical report, statement or other instrument, the same shall be sent by registered

mail addressed to the parties at the following addresses, respectively, or to such other addresses as they may specify to each other in writing, viz.:

If to Lessors: Agnes Louise Dean
234 Allen Lane, Mt. Airy
Philadelphia 19, Pennsylvania

and to

Leonard E. Oslund, Attorney for Lessors
702 Thorpe Building
Minneapolis 2, Minnesota

If to Lessee: Robert M. Adams
Duluth 2, Minnesota

XVI. It is further mutually agreed that all the grants, stipulations and conditions herein expressed shall apply to and bind the successors, heirs, executors, administrators and assigns (as the case may be) of the said respective parties.

IN WITNESS WHEREOF, this instrument has been executed by the parties hereto as of the day and the year first above written.

Signed and acknowledged
in the presence of:

/s/
Leo F. Mc Innis

/s/ Jason C. Sawyer
As to Agnes Louise Dean

/s/ Victoria - Casali

/s/ E. A. Canadden
As to Helen Dean Bogan

/s/ Amanda Sanders

/s/ Ruth V. Rowe
As to Carolyn E. Dean

Estate of Alfred J. Dean, Deceased

/s/ Agnes Louise Dean
Agnes Louise Dean

/s/ Helen Dean Bogan
Helen Dean Bogan

/s/ Carolyn E. Dean

/s/ Gertrude E. Campbell

/s/ Frederick C. Dean
As to Harold F. Dean

/s/ Harold F. Dean
Harold F. Dean

As Executors

First Parties

/s/ Laura A. Wilson

/s/ Malcom M. Adams
As to Robert M. Adams

/s/ Robert M. Adams
Robert M. Adams

Second Party

STATE OF NEW HAMPSHIRE)
)ss
COUNTY OF CHESHIRE)

On this 13th day of June, 1949, before me, a Notary Public, personally appeared AGNES LOUISE DEAN, to me know to be the person described in and who executed the foregoing instrument, and acknowledged that she executed the same as her free act and deed.

/s/ Norman T. Jackson
Notary Public
My commission expires 9/8/53

STATE OF CALIFORNIA)
)ss
COUNTY OF SANTA BARBARA)

On this 1st day of June, 1949, before me a Notary Public, personally appeared HELEN DEAN BOGAN, to me known to be the person described in and who executed the foregoing instrument, and acknowledged that she executed the same as her free act and deed.

/s/ Cragg Walston
Notary Public
My commission expires 1/8/50

STATE OF CALIFORNIA)
) ss
COUNTY OF LOS ANGELES)

On this 3rd day of June, 1949, before me, a Notary Public, personally appeared CAROLYN E. DEAN, to me known to be the person described in and who executed the foregoing instrument, and acknowledged that she executed the same as her free act and deed.

/s/ Catherine Ellis
Notary Public

My commission expires 11/15/52

STATE OF VERMONT)
) ss
COUNTY OF WINDHAM)

On this 11th day of June, 1949, before me, a Notary Public, personally appeared HAROLD F. DEAN, to me known to be the person described in and who executed the foregoing instrument, and acknowledged that he executed the same as his free act and deed.

/s/ Gertrude F. Campbell
Notary Public

My commission expires 2/10/51

STATE OF MINNESOTA)
) ss
COUNTY OF ST. LOUIS)

On this 30th day of June, 1949, before me, a Notary Public, personally appeared ROBERT M. ADAMS, to me known to be the person described in and who executed the foregoing instrument, and acknowledged that he executed the same as his free act and deed.

/s/ Florence Shoberg
Notary Public

My commission expires 11/18/53

Form MF-103
(Revised June 1951)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Budget Bureau No. 42-R1035.1.

MF-103 Should Be Filed With General Technical Data Form MF-100

APPLICATION FOR AID FOR AN EXPLORATION PROJECT PURSUANT TO MINERAL ORDER 5, UNDER DEFENSE PRODUCTION ACT OF 1950

Not To Be Filled in by Applicant

Docket No. DMEA-2405
Metal or Mineral
Date Received 3-3-52
Amount $
Participation (Government %)

ADAMS BROTHERS COMPANY
12TH FLOOR FIDELITY BUILDING
DULUTH 2, MINNESOTA

Name and address of applicant

Date February 1, 1952

If you have already filed MF-100, give date filed _____, type of assistance requested _____,

DMA Docket Number (if available) _____

INSTRUCTIONS

Read Mineral Order 5, Regulations Governing Government Aid in Defense Projects, before completing this application. Submit four copies each, of the signed application form, General Technical Data Form MF-100, and answers to questions as specified, to Defense Minerals Administration, Department of the Interior, Washington 25, D. C., or to the nearest field executive office thereof, with your name and address on each sheet of the application and all accompanying papers. If you have previously filed MF-100, it is not necessary to file it again. However, you should indicate in space provided above the type of assistance previously applied for (loans, procurement contracts, etc.) and DMA Docket Number, if available. *When a question is inapplicable it should be so stated in the form.* Additional sheets should be attached in answering any questions or in supplying additional information. IF YOU CANNOT ANSWER A QUESTION, SO STATE.

1. (*a*) Give a description of the real property that will be in any way involved in the exploration project, including any existing mine or operating property. See attached sheet.

   (*b*) If you are not the owner of the property, submit a copy of the lease, purchase option, or other agreements under which you are authorized to operate the property with each copy of your application. See attached sheet.

   (*c*) Give the legal description of the exact parcel, plot, or area upon which the exploration is to be conducted. See attached sheet.

   NOTE: (1) If both areas are the same, so state. The only obligation to repay the Government is from the net earnings from any commercial discovery made in the area specified in (*c*) above in which the exploration is to be conducted, and the expenditure of funds which may be charged as costs of the project must be limited to that area or to work necessary to perform the exploration in that area.

   (2) If applicant is not the owner of the property or if there are any liens or encumbrances against the property, copy of agreements of claimants, lienors, encumbrances, and lessors subordinating their interests in the property to the interest of the Government under the Exploration Project Contract will be required for attachment to the Contract.

Because Defense Minerals Administration
RECEIVED
MAR 3 - 1952

2. (*a*) What metals or minerals do you expect to find? See attached sheet.

   (*b*) Furnish statement of the geologic features of your property, giving type of ore deposit and reasons for expecting to find commercial ore bodies. Illustrate with maps or sketches. If you have a geologic or engineering report, or assay maps showing width and grade, please send them with application, stating whether or not you wish to have them returned.

   See attached sheet.

The information requested in questions 3, 4, 5, 6, 7, 8, and 9 below should be answered specifically and in detail, as this information will be attached to and incorporated as part of the Exploration Project Contract, if such contract is entered into with you by the Government.

ANSWER EACH QUESTION ON SEPARATE SHEETS OF PAPER AND SUBMIT A COPY OF EACH ANSWER FOR EACH COPY OF YOUR APPLICATION.

3. (*a*) Describe fully the proposed work and give the total cost of the project.

   (*b*) State the time required to start the project and to complete it.

4. Submit a map or sketch of the property involved showing a plan (and cross section, if needed) of the present mine workings and the *location of the proposed exploration work* as related to geologic features, such as contacts, veins, ore-bearing beds, etc.

5. Furnish an itemized list of existing facilities, buildings, installations, and fixtures with a statement of the cost of any necessary rehabilitation or repairs to put into useful and operable condition. None.

6. Furnish a detailed list of additional facilities, buildings, and fixtures to be purchased, installed, or erected by you, with the estimated cost of each item. None.

7. Furnish a detailed list of operating equipment, separated into items to be—

   (*a*) Rented

   (*b*) Purchased

   (*c*) Furnished by you

   with the rental, purchase price, or depreciation of each item, as the case may be, to be charged as a cost of the project.

8. Furnish an itemized schedule of labor, by numbers and classes (miners, muckers, etc.) and of supervisors by numbers and positions, with the maximum wages or salaries to be paid to each. See Item 9.

9. Furnish a detailed list with estimated cost of each item for materials, supplies, engineering, assaying, accounting, power, water, utilities, and any other items not provided for above.

10. (*a*) How much are you prepared to invest in the proposed project?

    (*b*) Is this amount sufficient to pay your part of the cost of the project, in accordance with the regulations on Government participation (Sec. 9 of MO–5)?

11. State any conditions or circumstances regarding the property not sufficiently brought out by the foregoing questions.

CERTIFICATION

The undersigned company, and the official executing this certification on its behalf, hereby certify that the information contained in this form and accompanying papers is correct and complete to the best of their knowledge and belief.

ADAMS BROTHERS COMPANY
(Name of company)

By [signature]
(Signature of authorized official)

February 1, 1952
(Date)

President
(Title)

Title 18, U. S. Code (Crimes), Section 1001, makes it a criminal offense to make a willfully false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.

U. S. GOVERNMENT PRINTING OFFICE 16—64067-2

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

1. (a) While the belt of manganese bearing formation may extend northeast and southwest through the south part of Section 20, through the northwesterly part of Section 29, across Section 30, all in Township 47, Range 29, and into the Southeast quarter (SE¼) of Section 25, Township 47, Range 30, the exploration will be limited to a smaller area. See 1 (c).

(b) The applicant holds under two leases the Northwest quarter (NW¼) of Section 29, Township 47, Range 29.

(c) The explorations contemplated would be upon the Northwest quarter (NW¼) of Section 29, Township 47, Range 29.

Copies of the two leases are attached.

Enclosure to Application
Form MF-103

2. (a) Manganese.

(b) Section 29 Area Manganese.

The presence of manganese in this area has been known since the early days of the Cuyuna Range of Minnesota.

The early prospectors on the Cuyuna were first attracted to the district by well defined lines of high magnetic intensity which were later found to be associated with ore bodies. Extensive dip-needle surveys were made over much of the area now known as the Cuyuna Range, and the lines of high magnetic intensity were followed in the exploration by drilling.

One of these magnetic lines occurs in Sections 29 and 30, Township 47 North, Range 29 West, in Crow Wing County, Minnesota. The area was first explored in 1906 as a possible source of iron ore. The glacial drift overburden was found to be from eighty feet to one hundred and fifty feet and more.

A greenish gray formation was found under the drift which was reported by various explorers as schist, slate and iron formation. Where there was oxidation

and the formation was stained red, some of the drill cores and cuttings were assayed and found to carry from twenty to thirty per cent iron. Manganese was not important at the time.

The Cuyuna Range manganiferous ores were well known and attracted wide attention during the World War I period, 1915-1918, and the search for additional manganiferous ore deposits was intense. The Section 29 Area was explored and abandoned because, although drill samples assayed between five and ten per cent dry manganese in places, the per cent of iron was low and the material was not a typical Cuyuna Range manganiferous ore.

More recently, in 1949, the area was again explored in an attempt to find, by closer drilling, manganiferous ore lenses in the wide belt of manganese bearing schists and slates. After twelve holes were drilled by one company in Section 30 and five holes in Section 29 by another company, the area was again abandoned as a source of manganiferous ore suitable for blast furnace use.

When the critical shortage of manganese for ferromanganese was brought to the attention of Adams

Brothers Company, who were recent explorers of Section 29, an investigation was started.

Although the material found in the Section 29 Area was evidently unsuitable for the preparation of manganiferous ore, it was thought it might be suitable for the preparation of ferro-manganese.

A rough estimate of an area seven hundred feet wide and twenty-six hundred feet long, in the area where the most drilling data are available, showed 11,000,000 tons of material assaying 4.95 per cent manganese and 25.58 per cent iron which had been classified as slates and schists from the drill cores and cuttings.

The average depth of the drill holes included in the estimate was one hundred and fifteen feet in glacial drift and seventy-six feet in ledge. There is no evidence that the holes were drilled through the formation.

The remnants of the samples available from the drillings were found to be inadequate for the determination of the suitability of the material for the preparation of ferro-manganese.

The explorations in the area indicate the presence of a large tonnage of manganese bearing carbonaceous

slates which are unsuitable for the preparation of manganiferous ore for blast furnace use. These slates may be an economic source of manganese for other purposes.

The drilling to date has not determined the structure or the extent of the manganese bearing formations either in length, width or depth. It is proposed to determine these factors by further churn and diamond drilling: First, by deeper holes to determine the structure and economic value of the material; then, if the formations are found to be suitable for the economic production of manganese, by shallower holes to determine the extent.

It is estimated that the preliminary exploration program in the NW¼, Section 29-47-29, should include four (4) structure holes and thirty-two (32) areal holes, which would require approximately thirty-three hundred (3300) feet of drilling through surface and fourteen hundred and eighty (1480) feet of drilling in ledge.

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

3. (a) It is estimated that the preliminary exploration program in the NW¼, Section 29-47-29, should include four (4) structure holes and thirty-two (32) areal holes, which would require approximately thirty-three hundred (3300) feet of drilling through surface and fourteen hundred and eighty (1480) feet of drilling in ledge.

(b) The drilling could start about May 1, 1952, and the program could be completed within two years.

Note proposed drilling program outlined on map:

O Areal

Os Structure

Enclosure to Application
Form MF-103

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

4. See attached maps:

   1. Map of area.
   2. Map showing geology and proposed drilling program.
   3. Logs of drilling.
   4. Geological map.

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ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

7. (a), (b) and (c)

Adams Brothers Company will contract with ADEX Corporation to do the drilling.

Two complete churn and diamond drill outfits equipped for drilling BX holes in ledge will be furnished.

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ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

9. Drilling

3300 ft. surface drilling @ $5.00	$16,500	
1480 ft. ledge drilling @ $10.50	15,540	
Carbon loss, estimated	1,720	
		$33,760

Note: This particular ledge drilling will involve especial care, hence delays and more than ordinary cost.

Geology	
At the rate of $600 a month	2,960
Engineering	
At the rate of $500 a month	3,450
Sampling	
At the rate of $200 a month (Including preparation and filing)	1,970
Assays	
Estimated	1,230
Metallurgy	
Estimated	3,700
Overhead	
Travel, office, misc.	4,000
	$51,070

Enclosure to Application
Form MF-103

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

10. (a) $12,770.00.

(b) Yes.

Enclosure to Application
Form MF-105

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

11. The general plan of this program together with the reasons for it is as follows. This area on the Cuyuna Range has long been known as one of the areas of iron formation, containing manganese units, but it has not been developed, beyond exploratory drilling on various occasions by various parties. The material found by said drilling has not been of the type which is presently used on the Cuyuna Range for blast furnace mixture. However, this material might be a source of obtaining manganese for other uses.

The formation might extend over a considerable area, both in length and width. Accordingly, over two miles of possible strike has been acquired; in the main, by leaseholds on privately held property and by application to the State of Minnesota on lands owned by it.

In general, the drilling has shown both oxide and carbonate, each containing more or less manganese. If this oxide-carbonate belt should have sufficient continuity in length, width and depth, it might afford a substantial amount of manganese bearing formation which, from a mining standpoint, would appear to have no particularly bad features.

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

Located as this ground is on the north part of the Cuyuna Range, which district has all the necessary facilities for mining, a few of the favorable features for the development of a mine might be cited as follows:

A. The Mississippi River close by is a source of water.

B. The Minnesota Power & Light Company hi-line crossing the property.

C. Adequate roads from the towns of the Cuyuna Range and passable automobile roads on the property.

D. Railroad transportation within reasonable spur-track length by the Northern Pacific and the Soo Line railways.

E. Nearby towns with schools and other facilities.

F. Favorable surface conditions for stripping prevail upon the Cuyuna Range.

In view of the drilling which has been done to date and the character of the material thus made available for examination and assaying, the following questions present themselves:

A. Is the deposit continuous enough in length, width, and depth to provide ample tonnage for substantial open pit operation?

B. Will the average manganese content be sufficient?

C. Can the manganese be concentrated and extracted metallurgically and economically so as to compete with other sources of manganese?

The only way these questions can be answered would be, first, by further drilling to determine to some extent the limits of the formation and the apparent average manganese content; secondly, to drill several BX holes for the extraction of core for further testing purposes.

We plan on putting one drill on what might be termed area drilling; first, to try to find the North and South edges of the formation as well as enough indicated length and thickness. This work, of course, would show the average manganese content.

Another drill would drill in the present known heart of the area for the primary purpose of extracting core for determining the nature of the material.

In addition to the operation of drilling, samples would be taken to our sample house at Ironton and prepared and filed in the usual manner, assays being obtained from the Lerch Brothers laboratory in Crosby. At this stage the samples would thus be available for examination and for preparation for testing.

The drilling would naturally be guided from an engineering standpoint by the results being currently obtained and sufficient geological services would be made available so that the geology would be studied concurrently with the drilling and naturally as a guide thereto.

As to tests, various possible methods would be investigated and tried out and metallurgical advice and facilities would be made available for this phase of work.

It would not be intended to drill out this formation to its uttermost limits; that would be too long and expensive and unwarranted at this stage. But while endeavoring to learn by the only present available method (testing drill cores) whether the material can be metallurgically and economically handled, it is, of course, equally important to find that there is a sufficiently large and continuous ore body containing sufficient manganese. Hence, the drilling program is for two purposes.

If this drilling program, together with the geological and metallurgical studies, demonstrated a worthwhile source of manganese units, then it would be reasonable to assume that the necessary development would follow.

The proposed investment would of course not permit any development. It would probably be inadequate for a

complete exploration of the whole area but that is not necessary at this stage. It should be enough to cover sufficient drilling for the uses noted and sufficient technical studies to demonstrate whether the area warrants further development.

As to the qualifications of Adams Brothers Company, in 1949 Robert M. Adams formed this company to take over his new mining business in Minnesota and carry on his further explorations.

Cuyler Adams discovered the Cuyuna Range about 1905, and the Adams family has been actively associated with the exploration and development of the Range ever since.

Robert M. Adams started exploring on the Range in 1915 and has continued from that time. The following properties resulted from his work:

Maroco Mine
Evergreen Mine and Smelting plant
Hillcrest Group (Hillcrest, Arko and Alstead)
Mangan-Louise Group
Rabbit Lake Group
Virginia

THIS AGREEMENT, Made this 1st day of August, 1949, by and between GEORGE E. WHITFORD and DENORA ALMA WHITFORD, his wife, of Carrington, North Dakota, Parties of the First Part, Lessors, and ROBERT M. ADAMS, of Duluth, Minnesota, Party of the Second Part, Lessee,

W I T N E S S E T H :

I. That the Lessors, in consideration of the sum of One Dollar ($1.00) to them in hand paid by the Lessee, the receipt whereof is hereby acknowledged, and in further consideration of the covenants and conditions herein contained to be kept and performed by the Lessee, do hereby let, lease and demise to the Lessee, for the term of fifty (50) years from and after the date hereof, the following described lands and premises situated in the County of Crow Wing and State of Minnesota, viz:

> All of the surface and an undivided one-half (½) interest in the minerals in the Northwest Quarter (NW¼) in Section Twenty-nine (29), Township Forty-seven (47) north, Range Twenty-nine (29) west, according to the United States Government survey thereof;

which premises are leased to the Lessee for the purposes of exploring for, mining, taking out and removing therefrom the iron, manganese and manganiferous ore which is or which hereafter may be found on, in or under said lands, together with the right to construct all buildings, make all excavations, openings, ditches, drains, railroad and wagon roads and other improvements upon said premises, which are or may become necessary or suitable for the mining and removing of iron, manganese and manganiferous ore from said premises; provided, however, that the Lessee shall have the right at any time to terminate this agreement by giving

(60) days' written notice to the Lessors by mail, and in case notice is given it may be addressed to the said Lessors or others having their estate in the premises at the place or places, respectively, at which royalty is for the time being payable hereunder, and thereupon the foregoing lease and demise shall terminate, and all arrearages and sums which may be due under the same up to and including the date of its determination as set forth in such notice shall be paid upon settlement and adjustment thereof. The Lessors further agree that the Lessee shall have the right, under this agreement, to contract with others to work such mine or mines, or any part thereof or to sub-contract the same, and the use of said land or any part thereof for the purpose of mining iron, manganese and manganiferous ore, with the same rights and privileges as are herein granted to the said Lessee, and that the uninterrupted right of the Lessee to take, use and carry away the iron, manganese and manganiferous ore herein provided for shall continue unsuspended, notwithstanding any disagreement between the parties hereto respecting the same or this contract, provided he shall duly pay for all ore taken or agreed to be taken at the time or times and in the manner stipulated in and by this contract.

In case the premises leased hereby shall be mined and operated by the Lessee in connection with other adjoining property not covered hereby, the Lessee shall have the right to use said demised premises for proper ingress and egress to and from said adjoining properties by railroad tracks, wagon roads, pole lines, launders, pipe lines, etc., and shall have the right to handle all such property as one unit in the proper operation thereof, mining through one property to another, provided, always that the ore mined from the demised premises shall be kept separate and apart

and separately accounted for in accordance herewith.

II. The Lessee, in consideration of the premises, hereby covenants and agrees to and with the Lessors, that the Lessee will on the 20th days of January, April, July and October or on the day ensuing if that day falls on Sunday, in each year during the period hereinbefore stipulated, or during the period this contract continues in force, commencing with October 20, 1949, pay to or for the use of the Lessors, at such bank or banks in any city of the United States as the Lessors or their successors in interest may from time to time in writing designate, for all the iron, manganese and manganiferous ore mined and removed from said lands during the three months preceding the first of the month in which payment is to be made as aforesaid, at the rate of twenty-five cents (25¢) per ton, or twelve and one-half cents (12½¢) per ton on the Lessors' interest, each ton to be reckoned at two thousand two hundred forty (2240) pounds; such payments to be made to the said Lessors, their respective successors or assigns, in proportion to their respective interests in said lands above described. Lessee at the time of such payment, shall transmit to the Lessors an exact and truthful statement of the amount of ore removed during the three months for which payments shall be made. The ores so taken by the Lessee from the said land, shall be weighed by the railway company transporting the same from the said land, which weights shall prima facie determine the quantity as between the parties hereto, but if said ore is delivered by the Lessee to the buyer thereof on the Cuyuna Range, weights of a standard Merrick weightometer which shall at all times be open to the inspection of the Lessors shall be accepted in lieu of railway weights. Said Lessee shall furnish the Lessors monthly

statements showing the aforesaid weights, the right, however, being hereby conceded to the Lessors, to inspect, review and test the correctness of said railway company's scales or the local buyer's weightometer and weights at any time and in such manner as the Lessors may see fit to adopt, it being understood that any errors in this respect, when ascertained, shall be recognized and corrected in their accounts.

Should any ore be removed from the premises to lands adjoining for the purpose of washing or otherwise treating the same to make it merchantable, in accordance with the subsequent provisions herein contained, the Lessee will, during the life of the lease, furnish to the Lessors monthly sworn statements showing how much ore has been so removed for that purpose the previous month, together with assays thereof, and also the quantity of ore washed, screened, dried or otherwise treated, during such previous month.

If the lessee should cancel this lease, as heretofore provided, he shall pay royalty on all ore so removed, whether the same has actually been washed, screened, dried or otherwise treated, or not.

III. The Lessee further covenants to pay all taxes and assessments, ordinary and extraordinary, general or specific, which may be levied or assessed against the Lessors' interest upon the demised lands and upon the whole thereof, and on the iron, manganese and manganiferous ore mined thereon, and all improvements and personal property thereon, while this lease shall continue in force, and to furnish the Lessors with duplicate tax receipts showing the payment of all such assessments, or taxes; provided,

however, that the Lessee shall always have the right to contest in the courts or otherwise, the validity of any such taxes or assessments in case he shall deem the same unlawful, unjust, unequal or excessive, or to take such other steps or proceedings as he may deem necessary to secure a cancelation, reduction, re-adjustment, or equalization thereof, before he shall be required to pay and discharge the same or any part thereof; but provided, further, that the Lessee shall not permit or suffer any lands and premises, or any part thereof, to be sold at any time for any taxes or assessments. And upon the termination of this lease by surrender or otherwise, as herein provided, the Lessee will peaceably surrender possession of said lands and the whole thereof to the Lessors, and said taxes levied and assessed for the year in which such termination shall become effective as to the whole of said premises or as to any government sub-division shall be prorated so that the Lessee shall be liable for the proportion of said taxes for said year as is represented by the portion of said time during which the Lessee held said surrendered premises.

IV. The Lessee further covenants and agrees that he will mine and ship from said lands, or pay royalty thereon to Lessors at the rate of twelve and one-half cents (12½¢) per ton, two thousand (2,000) gross tons as an annual agreed minimum output until April 1, 1952, and that from and after April 1, 1952, the annual minimum output shall be ten thousand (10,000) tons as long as this lease shall remain in effect. If in any one or more years while this lease shall remain in force the Lessee shall not actually ship from said lands the full quantity of the said agreed minimum output, the Lessee will nevertheless pay to the Lessors minimum or advance

royalty as hereinafter provided, in addition to the royalty paid for iron, manganese and manganiferous ore actually shipped during that year, such sum as shall, together with the amount paid as royalty for iron, manganese and manganiferous ore actually shipped during said year, amount to the minimum royalty payment required for that year. Said advance or minimum royalty shall be paid in equal quarterly installments upon the quarter days and in the manner herein provided for the payment of royalty on ore actually shipped. If in any quarter year the Lessee shall ship a quantity of iron, manganese and manganiferous ore in excess of one-fourth ($\frac{1}{4}$) of the agreed minimum output for that year, the royalty on all such ore in excess of one-fourth ($\frac{1}{4}$) of such annual minimum output may be satisfied, so far as the royalty on such excess will apply, by the application of any advance or minimum royalty ever theretofore paid under this lease and for which no ore has been actually shipped and of which no previous application has actually been made; and any royalty actually paid upon ore shipped in any quarter of any calendar year in excess of one-fourth ($\frac{1}{4}$) of the agreed minimum output for that year shall be in discharge, so far as the royalty on such excess will apply, of the obligation to pay advance or minimum royalty for any subsequent quarter or quarters of such calendar year. The obligation of the Lessee to pay advance or minimum royalties as aforesaid shall continue in force without regard to the quantity or quality of the iron, manganese and manganiferous ore existing on said land during the full term of this lease or until the same shall be determined or surrendered or assigned in the manner herein provided; and in case of an assignment of said lease the obligation to mine

ore or make such agreed yearly minimum royalty payment, as well as all other provisions of the lease shall bind the assignee as fully as the Lessee is bound hereby.

V. It is mutually understood and agreed that upon the termination of this agreement, whether by acts or the parties or by limitation, the Lessee shall have ninety (90) days in which to remove all engines, tools, machinery, railroad tracks and structures erected or placed by said Lessee on said lands, but shall not remove or impair any supports placed in the mines, nor any timbers or frameworks necessary to the use and maintenance of the shafts or other approaches to the mines, nor any tramways within the mines.

VI. The Lessee shall open, use and work said mines in such manner only as is usual and customary in the skillful and proper mining operations of similar character when conducted by the proprietors themselves, so as not to do, cause or permit any unnecessary or unusual permanent injury to the same, or inconvenience or hindrance in the subsequent operating of the same mine or mines; and in the working of said mine or mines the Lessee shall deposit all earth, overburden, rocks and other useless material or rubbish at such places and in such manner as will not conflict with or embarrass the future operating of said mines, and so long as such condition is complied with the Lessee shall have the right to deposit waste or overburden from adjoining properties operated by the Lessee in connection with the demised premises upon said demised premises, provided that in advance of dumping upon any such area the engineers of both parties agree upon any necessary drilling that might be needed in addition to that that might be

already done to prove such area as negative; that such drilling be done by the Lessee and such area or areas reasonably proven not to contain open pit ore, which, all factors considered, would be merchantable; and provided, further, that for any waste from adjoining premises deposited upon the demised premises a like amount of waste from the demised premises shall be deposited elsewhere within two years from the date of such deposit or dumping, so that no greater amount of waste shall be deposited upon the demised premises than would have resulted had the demised premises been operated alone; and provided, further, that no notice of cancellation of lease shall be effective until this clause has been complied with and such dumping equalized as between the demised premises and adjoining properties.

VII. The Lessors expressly reserve for themselves (and the parties hereto agree that the Lessors shall have) the right, by their agents or servants, to enter into and upon the above demised premises, and any part or parts thereof, at any time or times, to inspect and survey the same and measure the quantity of ores that shall have been mined or removed therefrom, not unnecessarily or unreasonably hindering or interfering with the work or operations of the Lessee.

The Lessee shall and will furnish the Lessors monthly reports of all explorations carried on by means of drills from the surface, including blue prints showing location of all drill holes thereon, also analyses of all iron found therein; and will furnish Lessors annually, mine maps showing all drifts, crosscuts and openings in any mine or mines opened and worked on the premises.

The covenants, terms and conditions of this lease shall run with the land and be in all respects binding and operative on all sublessees and assignees under the said Lessee but this lease shall not be assigned by the Lessee, except to reputable and responsible parties.

VIII. The Lessee agrees that when this lease shall for any cause terminate he will enter or cause to be entered a certificate of that fact upon the proper book of record in the county where the land is situated, provided this lease shall have been recorded there.

IX. This lease is granted and accepted upon condition that if the royalty hereby reserved, or any part thereof, be and remain unpaid after the days and times above specified, or the Lessee shall fail to keep any of the covenants or conditions herein expressed to be kept and performed by him, and if any such failure or failures in payments or otherwise shall continue for sixty (60) days after the receipt by him of written notice from the Lessors, specifying the default, neglect and failure complained of, then, and from thenceforth, and in either of said events, but not otherwise, it shall be lawful for the Lessors, at their option, to take possession of the said leased premises with or without any previous process whatever, to re-enter and have and possess the same as fully as if no lease had been given to the Lessee, and the said Lessee and all parties claiming under him shall be wholly excluded therefrom, and this lease shall become and be wholly void and at an end and subject to the provisions of Paragraph V hereof.

X. It is understood that the Lessors reserve, and shall

at all times have, possess and hold a lien upon all ore mined and all improvements made on said premises by the Lessee as security for any unpaid balances of money due under this contract, whether for royalties, taxes or otherwise, such balances being deemed to be treated as balances of purchase money, and which lien may be enforced against such property in like manner as liens conferred by chattel mortgages are or may be entitled to be enforced under the laws of the State of Minnesota.

XI. The Lessee covenants that while this lease shall remain in force and until it is surrendered or assigned, as in manner herein provided, he will protect the said land and the improvements and iron ore in stockpile thereon from all mechanics' and laborers' liens and keep the title to the same free and clear from all clouds or encumbrances arising from such liens in any way caused by his mining operations thereon or the use and occupation thereof by the Lessee, his agents, servants, employees or contractors.

XII. If, in any of said mining operations, ore shall be encountered which shall not then be merchantable in its natural condition, the Lessee shall have the right, at his option, to wash, dry, screen, sinter, agglomerate, or otherwise treat the same in order to make it merchantable, and the royalties shall accrue on such product or concentrate and not upon the crude ore before such treatment.

Such treatment of the ore in order to make it merchantable may be conducted by the Lessee either on the lands hereby

demised or on other lands adjoining or in the vicinity available for the installation of a plant adapted to such purpose; provided, that the Lessee shall first obtain the fee or a lease of such other lands in such manner that the lien and rights of the Lessors herein shall be fully preserved and protected as to any ore removed thereto, to the same extent as though it remained on the land herein demised. The removal of such ore from the demised premises to any other lands, for the purpose of treating the same, shall not be deemed to be a mining and removal from the demised premises so as to cause the royalty herein provided for to accrue thereon, until the ore product or concentrate of such treatment shall be actually shipped and weighed by the railroad company transporting the same.

In the event of said ore being treated on lands other than the demised premises, it shall be treated separately and apart from all other ores and separately loaded on railroad cars for transportation, and separately weighed, and all of said operations shall be conducted and completed within a reasonable length of time.

In case such plant is erected on the demised premises, the Lessee agrees that any refuse or waste arising from such treatment shall be so deposited as to not interfere with the future operation of any mine or mines on the demised premises.

In the event that said second party or his assigns desires to treat ore from other properties operated by him or his assigns in the vicinity in a plant erected on said demised premises,

it is hereby agreed that the second party or his assigns shall have the right, power, use and authority to treat said other ores upon the property of the first parties herein demised, provided that all waste, refuse and unused materials from said washing operations of ore from other property shall be deposited outside and beyond the limits of the property of the first parties. The intention being that no greater amount of waste or refuse or unused material shall be left or deposited upon the demised premises than would result from the washing of the ore from said demised premises, and it is further agreed by the parties hereto that the party of the second part shall take all reasonable steps required by the parties of the first part for keeping a separate account of the ore mined from the demised premises from the ore washed from other properties, and all expenses connected with such operations shall be borne by the party of the second part, and said washing plant shall be entirely clean of ore of the parties of the first part before starting to wash the ores from other properties.

The Lessee further agrees to conduct the washing, screening, drying or other treatment in a good and workmanlike manner according to good engineering practice and so as not to cause any greater waste of such ore than is necessary to render the ore product or concentrate thereof merchantable and of proper composition and character for successful and economical furnace use, and that he will use in any such treatment proper machinery and appliances to that end.

XIII. The Lessors hereby represent and covenant with the Lessee that they are at the time of the execution and delivery

hereof well seized in fee of said surface and one-half ($\frac{1}{2}$) interest in said minerals by good, perfect and indefeasible title thereto; that the said land is free from all liens and encumbrances, and that they have the right to lease the same in manner as in this lease provided, and the Lessee in the quiet and peaceable possession of said land, as Lessee, for the purpose of this lease provided, they will to the extent of their respective interests forever warrant and defend against all lawful claims or demands whatsoever, save and except only such claims or demands as may be created by the Lessee, or exist by virtue of his acts or omissions.

XIV. Arbitration Clause. In case any disagreement or controversy shall arise between the parties hereto relative to the observance or fulfillment of the terms and obligations hereof by either party, then such controversy or disagreement shall be determined by arbitration. Either party may within thirty (30) days after such disagreement arises, demand arbitration thereof, and the party or parties making such demand shall in writing specify the matter to be submitted to arbitration and at the same time choose and nominate some disinterested competent person to act as an arbitrator; thereupon, within ten (10) days after receipt of such written notice, the other party to this lease shall in writing choose and nominate a disinterested and competent arbitrator and the two arbitrators so chosen shall forthwith select a third arbitrator, giving written notice to both parties of the choice so made and fixing a place and time for meeting not later than thirty (30) days thereafter, at which both parties may appear and be heard touching such controversy. The decision of said arbitrators shall be made in writing within thirty (30) days after the

completion of hearings thereon, and when signed by a majority of them shall be final and conclusive upon both parties and the award so made shall be forthwith complied with. In case the notified party shall neglect or refuse to choose and nominate an arbitrator as above provided and within the time hereinabove specified, then the party demanding arbitration shall have the right to name the second arbitrator. In case the two chosen by either of the above methods shall fail to agree upon a third arbitrator and give notice as herein provided, such third arbitrator shall, upon the application of either party, be named by the person who may then be holding the office of Judge of the United States District Court in and for the district in which Duluth, Minnesota, is located, or the person holding an office which corresponds to such office as now extant if it shall then have been abolished.

The expense of any such arbitration, including reasonable compensation for the arbitrators shall be paid by the party against which the award therein shall be made, or as otherwise determined by the arbitrators.

XV. Notwithstanding any of the other provisions herein contained, whenever it is necessary to serve upon or deliver to the parties to this lease any written notice, periodical report, statement or other instrument, the same shall be sent by registered mail addressed to the parties at the following addresses, respectively, or to such other addresses as they may specify to each other in writing, viz.:

If to Lessors: George E. Whitford
Carrington, North Dakota

If to Lessee: Robert M. Adams
Duluth 2, Minnesota

XVI. It is further mutually agreed that all the grants, stipulations and conditions herein expressed shall apply to and bind the successors, heirs, executors, administrators and assigns (as the case may be) of the said respective parties.

IN WITNESS WHEREOF, this instrument has been executed by the parties hereto as of the day and the year first above written.

Signed and acknowledged
in the presence of:

/s/ C. W. Burnham

/s/ Lucille Burnham
As to George E. Whitford and
Denora Alma Whitford

/s/ R. O. Lee

/s/ Cherrill W. Adams
As to Robert M. Adams

/s/ George E. Whitford
George E. Whitford

/s/ Denora Alma Whitford
Denora Alma Whitford

FIRST PARTIES

/s/ Robert M. Adams
Robert M. Adams

SECOND PARTY

AMENDMENTS TO LEASE AGREEMENT

IT IS UNDERSTOOD THAT the within Section XVII and Section XVIII are additional sections to the hereunto attached lease made and entered into between George E. Whitford and Denora Alma Whitford, his wife and Robert A. Adams, dated on the 1st day of August A. D., 1949, and are to have the same force and effect as if they were fully incorporated and set forth in the body of said lease with the same section numbers, and are as follows, to-wit:

SECTION XVII. That nothing contained in said lease shall in any manner whatsoever effect or contradict or be in conflict with the provisions of that certain easement made and entered into by and between the said George E. Whitford and Denora Alma Whitford, his wife, and the Minnesota Power & Light Company, which said easement grants to said company the perpetual right, privilege and easement to construct, maintain and operate an electric transmission line, with the necessary poles, cross-arms, guy, braces, wires and appurtenances, across the real estate in said lease described, said easement being dated December 20, 1948.

SECTION XVIII. That the Lessors in said lease reserve unto themselves all growing timber on said land, and that the said lessee shall not cut or destroy any growing timber thereon, except any such as may interfere with the operation of any mining done on said land.

Dated August 1, 1949

/s/ George E. Whitford

/s/ Denora Alma Whitford
Lessors

/s/ Robert M. Adams
Lessee

STATE OF NORTH DAKOTA)
) ss
COUNTY OF FOSTER)

On this 1st day of August, 1949, before me, a Notary Public, personally appeared GEORGE E. WHITFORD and DENORA ALMA WHITFORD, his wife, to me known to be the persons described in and who executed the foregoing instrument, and acknowledged that they executed the same as their free act and deed.

/s/ C. W. Burnham
Notary Public

My commission expires 10-25-51.

STATE OF MINNESOTA)
) ss
COUNTY OF CROW WING)

On this 26th day of August, 1949, before me, a Notary Public, personally appeared ROBERT M. ADAMS, to me known to be the person described in and who executed the foregoing instrument, and acknowledged that he executed the same as his free act and deed.

/s/ R. O. Lee
Notary Public

My commission expires 4-14-54

THIS AGREEMENT, Made this 1st day of June, 1949, by and between AGNES LOUISE DEAN, HELEN DEAN BOGAN, CAROLYN E. DEAN, as Executors of the Estate of ALFRED J. DEAN, Deceased, Parties of the First Part, Lessors, and ROBERT M. ADAMS, of Duluth, Minnesota, Party of the Second Part,

W I T N E S S E T H :

I. That the Lessors, in consideration of the sum of One Dollar ($1.00) to them in hand paid by the Lessee, the receipt whereof is hereby acknowledged, and in further consideration of the covenants and conditions herein contained to be kept and performed by the Lessee, do hereby let, lease and demise to the Lessee, for the term of fifty (50) years from and after the date hereof, the following described lands and premises situated in the County of Crow Wing and State of Minnesota, viz:

> An Undivided One-half ($\frac{1}{2}$) interest in the minerals in the Northwest Quarter (NW$\frac{1}{4}$) in Section Twenty-nine, (29), Township Forty-seven (47) north, Range Twenty-nine (29) west, according to the United States Government survey thereof;

which premises are leased to the Lessee for the purposes of exploring for, mining, taking out and removing therefrom the iron, manganese and manganiferous ore which is or which hereafter may be found on, in or under said lands, together with the right to construct all buildings, make all excavations, openings, ditches, drains, railroad and wagon roads and other improvements upon said premises, which are or may become necessary or suitable for the mining and removing of iron, manganese and manganiferous ore from said premises; provided, however, that the Lessee shall have the

right at any time to terminate this agreement by giving sixty (60) days written notice to the Lessors by mail and in case notice is given it may be addressed to the said Lessors (or others having their estate in the premises) at the place (or places, respectively,) at which royalty is for the time being payable hereunder, and thereupon the foregoing lease and demise shall terminate, and all arrearages and sums which may be due under the same up to and including the date of its determination as set forth in such notice shall be paid upon settlement and adjustment thereof. The Lessors further agree that the Lessee shall have the right, under this agreement, to contract with others to work such mine or mines, or any part thereof or to sub-contract the same, and the use of said land or any part thereof for the purpose of mining iron, manganese and manganiferous ore, with the same rights and priviliges as are herein granted to the said Lessee, and that the uninterrupted right of the Lessee to take, use and carry away the iron, manganese and manganiferous ore herein provided for shall continue unsuspended, notwithstanding any disagreement between the parties hereto respecting the same or this contract, provided he shall duly pay for all ore taken or agreed to be taken at the time or times and in the manner stipulated in and by this contract.

In case the premises leased hereby shall be mined and operated by the Lessee in connection with other adjoining property not covered hereby, the Lessee shall have the right to use said demised premises for proper ingress and egress to and from said adjoining properties by railroad tracks, wagon roads, pole lines, launders, pipe lines, etc., and shall have the right to

handle all such property as one unit in the proper operation thereof, mining through one property to another, provided, always that the ore mined from the demised premises shall be kept separate and apart and separately accounted for in accordance herewith.

II. The Lessee, in consideration of the premises, hereby covenants and agrees to and with the Lessors, that the Lessee will on the 20th days of January, April, July and October or on the day ensuing if that day falls on Sunday, in each year during the period hereinbefore stipulated, or during the period this contract continues in force, commencing with October 20, 1949, pay to or for the use of the Lessors, at such bank or banks in any city of the United States as the Lessors or their successors in interest may from time to time in writing designate, for all the iron, manganese and manganiferous ore mined and removed from said lands during the three months preceding the first of the month in which payment is to be made as aforesaid, at the rate of twenty-five cents (25¢) per ton, or twelve and one-half cents (12½¢) per ton on the Lessors one-half (½) interest, each ton to be reckoned at two thousand two hundred forty (2240) pounds; such payments to be made to the said Lessors, their respective successors or assigns, in proportion to their respective interests in said lands above described. Lessee at the time of such payment, shall transmit to the Lessors an exact and truthful statement of the amount of ore removed during the three months for which payments shall be made. The ores so taken by the Lessee from the said land, shall be weighed by the railway company transporting the same from the said land, which weights shall prima facie determine the quantity as

between the parties hereto, but if said ore is delivered by the Lessee to the buyer thereof on the Cuyuna Range, weights of a standard Merrick weightometer which shall at all times be open to the inspection of the Lessors shall be accepted in lieu of railway weights. Said Lessee shall furnish the Lessors monthly statements showing the aforesaid weights, the right, however, being hereby conceded to the Lessors, to inspect, review and test the correctness of said railway company's scales or the local buyer's weightometer and weights at any time and in such manner as the Lessors may see fit to adopt, it being understood that any errors in this respect, when ascertained, shall be recognized and corrected in their accounts.

Should any ore be removed from the premises to lands adjoining for the purpose of washing or otherwise treating the same to make it merchantable, in accordance with the subsequent provisions herein contained, the Lessee will, during the life of the lease, furnish to the Lessors monthly sworn statements showing how much ore has been so removed for that purpose the previous month, together with assays thereof, and also the quantity of ore washed, screened, dried or otherwise treated, during such previous month.

If the Lessee should cancel this lease, as heretofore provided, he shall pay royalty on all ore so removed, whether the same has actually been washed, screened, dried or otherwise treated, or not.

III. The Lessee further covenants to pay all taxes and assessments, ordinary and extraordinary, general or specific, which may be levied or assessed against the Lessors' one-half ($\frac{1}{2}$) interest

upon the demised lands and upon the whole thereof, and on the iron, manganese and manganiferous ore mined thereon, and all improvements and personal property, thereon, while this lease shall continue in force, and to furnish the Lessors with duplicate tax receipts showing the payment of all such assessments, or taxes; provided, however, that the Lessee shall always have the right to contest in the courts or otherwise, the validity of any such taxes or assessments in case he shall deem the same unlawful, unjust, unequal or excessive, or to take such other steps or proceedings as he may deem necessary to secure a cancelation, reduction, re-adjustment, or equalization thereof, before he shall be required to pay and discharge the same or any part thereof; but provided, further, that the Lessee shall not permit or suffer any lands and premises, or any part thereof, to be sold at any time for any taxes or assessments. And upon the termination of this lease by surrender or otherwise, as herein provided, the Lessee will peaceably surrender possession of said lands and the whole thereof to the Lessors, and said taxes levied and assessed for the year in which such termination shall become effective as to the whole of said premises or as to any government sub-division shall be pro rated so that the Lessee shall be liable for the proportion of said taxes for said year as is represented by the portion of said time during which the Lessee held said surrendered premises.

IV. The Lessee further covenants and agrees that he will mine and ship from said lands, or pay royalty thereon to Lessors at the rate of twelve and one-half cents (12½¢) per ton, two thousand (2,000) gross tons as an annual agreed minimum output until April 1, 1952, and that from and after April 1, 1952, the annual minimum output shall be ten thousand (10,000) tons as long as this lease

shall remain in effect. If in any one or more years while this lease shall remain in force the Lessee shall not actually ship from said lands the full quantity of the said agreed minimum output, the Lessee will nevertheless pay to the Lessors minimum or advance royalty as hereinafter provided, in addition to the royalty paid for iron, manganese and manganiferous ore actually shipped during that year, such sum as shall, together with the amount paid as royalty for iron, manganese and manganiferous ore actually shipped during said year, amount to the minimum royalty payment required for that year. Said advance or minimum royalty shall be paid in equal quarterly installments upon the quarter days and in the manner herein provided for the payment of royalty on ore actually shipped. If in any quarter year the Lessee shall ship a quantity of iron, manganese and manganiferous ore in excess of one-fourth (¼) of the agreed minimum output for that year, the royalty on all such ore in excess of one-fourth (¼) of such annual minimum output may be satisfied, so far as the royalty on such excess will apply, by the application of any advance or minimum royalty ever theretofore paid under this lease and for which no ore has been actually shipped and of which no previous application has actually been made; and any royalty actually paid upon ore shipped in any quarter of any calendar year in excess of one-fourth (¼) of the agreed minimum output for that year shall be in discharge, so far as the royalty on such excess will apply, of the obligation to pay advance or minimum royalty for any subsequent quarter or quarters of such calendar year. The obligation of the Lessee to pay advance or minimum royalties as aforesaid shall continue in force without regard to the quantity or quality of the iron, manganese and man-

ganiferous ore existing on said land during the full term of this lease or until the same shall be determined or surrendered or assigned in the manner herein provided; and in case of an assignment of said lease the obligation to mine ore or make such agreed yearly minimum royalty payment, as well as all other provisions of the lease shall bind the assignee as fully as the Lessee is bound hereby.

V. It is mutually understood and agreed that upon the termination of this agreement, whether by acts of the parties or by limitation, the Lessee shall have ninety (90) days in which to remove all engines, tools, machinery, railroad tracks and structures erected or placed by said Lessee on said lands, but shall not remove or impair any supports placed in the mines, nor any timbers or frameworks necessary to the use and maintenance of the shafts or other approaches to the mines, nor any tramways within the mines.

VI. The Lessee shall open, use and work said mines in such manner only as is usual and customary in the skillful and proper mining operations of similar character when conducted by the proprietors themselves, so as not to do, cause or permit any unnecessary or unusual permanent injury to the same, or inconvenience or hindrance in the subsequent operating of the same mine or mines; and in the working of said mine or mines the Lessee shall deposit all earth, overburden, rocks and other useless material or rubbish at such places and in such manner as will not conflict with or embarrass the future operating of said mines, and so long as such condition is complied with the Lessee shall have the right

to deposit waste or overburden from adjoining properties operated by the Lessee in connection with the demised premises upon said demised premises, provided that in advance of dumping upon any such area the engineers of both parties agree upon any necessary drilling that might be needed in addition to that that might be already done to prove such area as negative; that such drilling be done by the Lessee and such area or areas reasonably proven not to contain open pit ore, which, all factors considered, would be merchantable; and provided, further, that for any waste from adjoining premises deposited upon the demised premises a like amount of waste from the demised premises shall be deposited elsewhere within two years from the date of such deposit or dumping, so that no greater amount of waste shall be deposited upon the demised premises than would have resulted had the demised premises been operated alone; and provided, further, that no notice of cancellation of lease shall be effective until this clause has been complied with and such dumping equalized as between the demised premises and adjoining properties.

VII. The Lessors expressly reserve for themselves (and the parties hereto agree that the Lessors shall have) the right, by their agents or servants, to enter into and upon the above demised premises, and any part or parts thereof, at any time or times, to inspect and survey the same and measure the quantity of ores that shall have been mined or removed therefrom, not unnecessarily or unreasonably hindering or interfering with the work or operations of the Lessee.

The lessee shall and will furnish the Lessors monthly reports of all explorations carried on by means of drills from

the surface, including blue prints showing location of all drill holes thereon, also analyses of all iron found therein; and will furnish Lessors annually, mine maps showing all drifts, crosscuts and openings in any mine or mines opened and worked on the premises.

The covenants, terms and conditions of this lease shall run with the land and be in all respects binding and operative on all sublessees and assignees under the said Lessee but this lease shall not be assigned by the Lessee, except to reputable and responsible parties.

VIII. The Lessee agrees that when this lease shall for any cause terminate he will enter or cause to be entered a certificate of that fact upon the proper book of record in the county where the land is situated, provided this lease shall have been recorded there.

IX. This lease is granted and accepted upon condition that if the royalty hereby reserved, or any part thereof, be and remain unpaid after the days and times above specified, or the Lessee shall fail to keep any of the covenants or conditions herein expressed to be kept and performed by him, and if any such failure or failures in payments or otherwise shall continue for sixty (60) days after the receipt by him of written notice from the Lessors, specifying the default, neglect and failure complained of, then, and from thenceforth, and in either of said events, but not otherwise, it shall be lawful for the Lessors, at their option, to take possession of the said leased premises with or without any previous process whatever, to re-enter and have and possess the

same as fully as if no lease had been given to the Lessee, and the said Lessee and all parties claiming under him shall be wholly excluded therefrom, and this lease shall become and be wholly void and at an end and subject to the provisions of Paragraph V hereof.

X. It is understood that the Lessors reserve, and shall at all times have, possess and hold a lien upon all ore mined and all improvements made on said premises by the Lessee as security for any unpaid balances of money due under this contract, whether for royalties, taxes or otherwise, such balances being deemed to be treated as balances of purchase money, and which lien may be enforced against such property in like manner as liens conferred by chattel mortgages are or may be entitled to be enforced under the laws of the State of Minnesota.

XI. The Lessee covenants that while this lease shall remain in force and until it is surrendered or assigned, as in manner herein provided, he will protect the said land and the improvements and iron ore in stockpile thereon from all mechanics' and laborers' liens and keep the title to the same free and clear from all clouds or encumbrances arising from such liens in any way caused by his mining operations thereon or the use and occupation thereof by the Lessee, his agents, servants, employees or contractors.

XII. If, in any of said mining operations, ore shall be encountered which shall not then be merchantable in its natural condition, the Lessee shall have the right, at his option, to wash, dry, screen, sinter, agglomerate, or otherwise treat the same in order to make it merchantable, and the royalties shall accrue on

such product or concentrate and not upon the crude ore before such treatment.

Such treatment of the ore in order to make it merchantable may be conducted by the Lessee either on the lands hereby demised or on other lands adjoining or in the vicinity available for the installation of a plant adapted to such purpose; provided, that the Lessee shall first obtain the fee or a lease of such other lands in such manner that the lien and rights of the Lessors herein shall be fully preserved and protected as to any ore removed thereto, to the same extent as though it remained on the land herein demised. The removal of such ore from the demised premises to any other lands, for the purpose of treating the same, shall not be deemed to be a mining and removal from the demised premises so as to cause the royalty herein provided for to accrue thereon, until the ore product or concentrate of such treatment shall be actually shipped and weighed by the railroad company transporting the same.

In the event of said ore being treated on lands other than the demised premises, it shall be treated separately and apart from all other ores and separately loaded on railroad cars for transportation, and separately weighed, and all of said operations shall be conducted and completed within a reasonable length of time.

In case such plant is erected on the demised premises, the Lessee agrees that any refuse or waste arising from such treatment shall be so deposited as to not interfere with the future operation of any mine or mines on the demised premises.

In the event that said second party or his assigns des-

ires to treat ore from other properties operated by him or his assigns in the vicinity in a plant erected on said demised premises, it is hereby agreed that the second party or his assigns shall have the right, power, use and authority to treat said other ores upon the property of the first parties herein demised, provided that all waste, refuse and unused materials from said washing operations of ore from other property shall be deposited outside and beyond the limits of the property of the first parties. The intention being that no greater amount of waste or refuse or unused material shall be left or deposited upon the demised premises than would result from the washing of the ore from said demised premises, and it is further agreed by the parties hereto that the party of the second part shall take all reasonable steps required by the parties of the first part for keeping a separate account of the ore mined from the demised premises from the ore washed from other properties, and all expenses connected with such operations shall be borne by the party of the second part, and said washing plant shall be entirely clean of ore of the parties of the first part before starting to wash the ores from other properties.

The Lessee further agrees to conduct the washing, screening drying or other treatment in a good and workmanlike manner according to good engineering practice and so as not to cause any greater waste of such ore than is necessary to render the ore product or concentrate thereof merchantable and of proper composition and character for successful and economical furnace use, and that he will use in any such treatment proper machinery and appliances to that end.

XIII. The Lessors hereby represent and covenant with the Lessee that they are at the time of the execution and delivery hereof well seized in fee of said one-half ($\frac{1}{2}$) interest in said minerals by good, perfect and indefeasible title thereto; that the said land is free from all liens and encumbrances, and that they have the right to lease the same in manner as in this lease provided, and the Lessee in the quiet and peaceable possession of said land, as Lessee, for the purpose of this lease provided, they will to the extent of their respective interests forever warrant and defend against all lawful claims or demands whatsoever, save and except only such claims or demands as may be created by the Lessee, or exist by virtue of his acts or omissions.

XIV. Arbitration Clause. In case any disagreement or controversy shall arise between the parties hereto relative to the observance or fulfillment of the terms and obligations hereof by either party, then such controversy or disagreement shall be determined by arbitration. Either party may within thirty (30) days after such disagreement arises, demand arbitration thereof, and the party or parties making such demand shall in writing specify the matter to be submitted to arbitration and at the same time choose and nominate some disinterested competent person to act as an arbitrator; thereupon, within ten (10) days after receipt of such written notice, the other party to this lease shall in writing choose and nominate a disinterested and competent arbitrator and the two arbitrators so chosen shall forthwith select a third arbitrator, giving written notice to both parties of

the choice so made and fixing a place and time for meeting not later than thirty (30) days thereafter, at which both parties may appear and be heard touching such controversy. The decision of said arbitrators shall be made in writing within thirty (30) days after the completion of hearings thereon, and when signed by a majority of them shall be final and conclusive upon both parties and the award so made shall be forthwith complied with. In case the notified party shall neglect or refuse to choose and nominate an arbitrator as above provided and within the time hereinabove specified, then the party demanding arbitration shall have the right to name the second arbitrator. In case the two chosen by either of the above methods shall fail to agree upon a third arbitrator and give notice as herein provided, such third arbitrator shall, upon the application of either party, be named by the person who may then be holding the office of Judge of the United States District Court in and for the district in which Duluth, Minnesota, is located, or the person holding an office which corresponds to such office as now extant if it shall then have been abolished.

The expense of any such arbitration, including reasonable compensation for the arbitrators shall be paid by the party against which the award therein shall be made, or as otherwise determined by the arbitrators.

XV. Notwithstanding any of the other provisions herein contained, whenever it is necessary to serve upon or deliver to the parties to this lease any written notice, periodical report, statement or other instrument, the same shall be sent by registered

mail addressed to the parties at the following addresses, respectively, or to such other addresses as they may specify to each other in writing, viz.:

If to Lessors: Agnes Louise Dean
234 Allen Lane, Mt. Airy
Philadelphia 19, Pennsylvania

and to

Leonard E. Oslund, Attorney for Lessors
702 Thorpe Building
Minneapolis 2, Minnesota

If to Lessee: Robert M. Adams
Duluth 2, Minnesota

XVI. It is further mutually agreed that all the grants, stipulations and conditions herein expressed shall apply to and bind the successors, heirs, executors, administrators and assigns (as the case may be) of the said respective parties.

IN WITNESS WHEREOF, this instrument has been executed by the parties hereto as of the day and the year first above written.

Signed and acknowledged
in the presence of:

Estate of Alfred J. Dean, Deceased

/s/
Leo F. Mc Innis

/s/ Agnes Louise Dean
Agnes Louise Dean

/s/ Jason C. Sawyer
As to Agnes Louise Dean

/s/ Victoria - Casali

/s/ Helen Dean Bogan
Helen Dean Bogan

/s/ H. W. Canadden
As to Helen Dean Bogan

/s/ Amanda Sanders

/s/ Carolyn E. Dean

/s/ Ruth V. Rowe
As to Carolyn E. Dean

/s/ Gertrude E. Campbell

/s/ Frederick C. Dean
As to Harold F. Dean

/s/ Harold F. Dean
Harold F. Dean

As Executors

First Parties

/s/ Laura A. Wilson

/s/ Malcom M. Adams
As to Robert M. Adams

/s/ Robert M. Adams
Robert M. Adams

Second Party

STATE OF NEW HAMPSHIRE)
) ss
COUNTY OF CHESHIRE)

On this 13th day of June, 1949, before me, a Notary Public, personally appeared AGNES LOUISE DEAN, to me know to be the person described in and who executed the foregoing instrument, and acknowledged that she executed the same as her free act and deed.

/s/ Norman T. Jackson
Notary Public
My commission expires 9/8/53

STATE OF CALIFORNIA)
) ss
COUNTY OF SANTA BARBARA)

on this 1st day of June, 1949, before me a Notary Public, personally appeared HELEN DEAN BOGAN, to me known to be the person described in and who executed the foregoing instrument, and acknowledged that she executed the same as her free act and deed.

/s/ Cragg Walston
Notary Public
My commission expires 1/8/50

STATE OF CALIFORNIA)
) ss
COUNTY OF LOS ANGELES)

On this 3rd day of June, 1949, before me, a Notary Public, personally appeared CAROLYN E. DEAN, to me known to be the person described in and who executed the foregoing instrument, and acknowledged that she executed the same as her free act and deed.

/s/ Catherine Ellis
Notary Public

My commission expires 11/15/52

STATE OF VERMONT)
) ss
COUNTY OF WINDHAM)

On this 11th day of June, 1949, before me, a Notary Public, personally appeared HAROLD F. DEAN, to me known to be the person described in and who executed the foregoing instrument, and acknowledged that he executed the same as his free act and deed.

/s/ Gertrude E. Campbell
Notary Public

My commission expires 2/10/51

STATE OF MINNESOTA)
) ss
COUNTY OF ST. LOUIS)

On this 30th day of June, 1949, before me, a Notary Public, personally appeared ROBERT M. ADAMS, to me known to be the person described in and who executed the foregoing instrument, and acknowledged that he executed the same as his free act and deed.

/s/ Florence Shoberg
Notary Public

My commission expires 11/18/53