DMA Form 1

DEFENSE MINERALS ADMINISTRATION
Control Slip

CONTROLLED DOCUMENT

DMEA ~~DMA~~ Docket No. 2404

DO NOT DETACH THIS SLIP

Action on this document is recorded and controlled in Reports and Records Branch. Any movement of this document between divisions or offices of DMA or movement outside DMA must be reported to the Reports and Records Branch. Actions taken that affect status of the case must also be reported.

This document has been recorded as

EXPLORATION PROJECT

Any action taken to change the type of request for assistance must be promptly reported to the Reports and Records Branch. Use DMA Form 2 for submitting these reports.

Routing Slip
Copies to USGS, USBM.

To: Code 400, Rm. 3538 Date 3-4-52

To: _____ Date _____

To: _____ Date _____

To: _____ Date _____

To: _____ Date _____

To: _____ Date _____

To: _____ Date _____

To: _____ Date _____

To: _____ Date _____

To: _____ Date _____

To: _____ Date _____

To: _____ Date _____

To: _____ Date _____

To: _____ Date _____

To: _____ Date _____

DO NOT DETACH

CONTROLLED DOCUMENT

MME Form 7
(10-58)

OFFICIAL FILE COPY

Date	Surname	Code
		22C

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

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

43683

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
APR 30 1954

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

April 28, 1954

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

A. B. NEEDHAM

400

FILE COPY
SURNAME:

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

NOV 14 1952

Mr. R. B. Reavill
Reavill, Jensweld, Heimeyer & Johnson
900 Alworth Building
Duluth 2, Minnesota

Re: Dockets Nos. DMRA 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. Reavill:

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 Aitken 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

S.H. 11-14-52

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

FILE COPY 400
SURNAME:

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

Administrator, DMEA

November 6, 1952

Selfridge

Iron and Ferro-Alloy Division, DMEA

BL

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

FILE COP400
SURNAME:

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

Oct. 21, 1952
Chapman

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.

FILE COPY 400
SURNAME:

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

Oct. 22, 1952

Chapman

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

FILE COPY 400
SURNAME:

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

Oct. 21, 1952

Chapman

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.

FILE COPY 400
SURNAME:

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

Oct. 23, 1952

Chapman

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.

FILE COPY 400
SURNAME:

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

Oct. 21, 1952

Chapman

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	

REAVILL, JENSWOLD, NEIMEYER & JOHNSON
ATTORNEYS AT LAW
900 ALWORTH BUILDING
DULUTH 2, MINNESOTA

R. B. REAVILL
JOHN D. JENSWOLD
R. H. NEIMEYER
JOSEPH B. JOHNSON
DONALD E. ANDERSON

FORMERLY
HOLMES, MAYALL, REAVILL & NEIMEYER

GCS
11/6/52

November 3, 1952

United States Department of the Interior
Defense Minerals Exploration Administration
Washington 25, D. C.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
NOV 4 1952

Attention: Mr. C. O. Mittendorf

Dear Mr. Mittendorf:

Re: Dockets Nos. DMEA 2404, 2405, 2406 -
Manganese
SE, SW, Sec. 20, T. 47 N. R. 29 W.
NW, Sec. 29, T. 47 N. R. 29 W.
SE, NE, Sec. 30, T. 47 N. R. 29 W.
Crow Wing County, Minnesota

You will recall our conference of October 9th this year with regard to Cuyuna Range Minnesota Manganese.

At the end of our conference it was understood that you would contact Walter E. Lewis, Geologist for the United States Bureau of Mines at Minneapolis, Dr. Frank F. Grout, Past Director of Minnesota Geological Survey, University of Minnesota, and Dr. G. M. Schwartz, Present Director of Minnesota Geological Survey, University of Minnesota, with regard to the statements I made to you at our conference concerning Cuyuna Range manganese.

At our conference I told you that it was my understanding that none of these men had been consulted and that all of them would advise you that the proposals contained in the above described applications were sound and that the facts therein stated are correct.

Upon my return to Duluth I made further inquiry and as a result thereof re-assert the statements which I made to you in Washington. None of the people above named were consulted by your Department. In fact, Dr. Schwartz tells us that he had anticipated that he would be consulted and had prepared a statement of his opinion with regard to the matter. Also, I again call your attention to the fact that these applications were made upon the advice of Mr. Lewis, the geologist for the United States Bureau of Mines, and we are confident that if your Department does consult him he will urge the granting of these applications.

I appreciate the fact that there has been talk of low-grade manganese on the Cuyuna Range for 35 or more years. However, in the main, this has been conversation and there has never been any definite organized attempt to find out whether or not there are any important tonnages of manganese-bearing carbonates suitable to the production of ferro-manganese. All that is actually known is that there are some manganese-bearing carbonates which leads to the conclusion that there is "the geologic probability of making a significant discovery". The quote is paragraph (b) of Section 6 of DMEA Order No. 1, which is stated to be one of the factors to be considered and weighed in passing upon applications.

I again call your attention to the fact that the assistance requested by the applications is not for the purpose of proving ore bodies, but is merely for the purpose of establishing whether or not there is reasonable expectation that usable ore bodies can be discovered. If this appears in the affirmative it is reasonable to assume that private industry which from time to time in the past has evidenced some interest in Cuyuna Range manganese, will be prepared to take over and spend such sums of money as may be necessary to establish the existence of such ore bodies, if any there are.

mk. tests

It is also to be assumed that private industry will be prepared to spend such sums as may be necessary to develop a process for the working of such ore bodies. I am sure that I am correct when I say that the lack of interest on the part of private industry in developing low-grade Cuyuna Range manganese is due to what has appeared to be the lack of interest of the United States Government. I am convinced that if the manganese picture is of as much concern to the Government as I understand it to be, and if the Government evidences this concern by making a real attempt to determine the exact status of Cuyuna Range manganese, private industry will be more than happy to take over, once it appears that there is a reasonable probability that substantial ore bodies of low-grade manganese actually exist.

I again wish to thank you for the very courteous hearing you and your assistants gave me in Washington.

Yours very truly,

R B Reavill

for

REAVILL, JENSWOLD, NEIMEYER & JOHNSON

RBR:V

Docket 400
FILE COPY
SURNAME:

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

S.E. Lodge
Chairman
J.E. Johnson

AUG 12 1952

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 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

soon 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 (for) J.N. 8-12-52

Acting Administrator

Enclosure

TLChapman-GCSelfridge'lm
8/12/52

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

FILE COPY
SURNAME:

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

JUN 23 1952

Adams Brothers Company
Duluth 2, Minnesota

Gentlemen:

In accordance with your request dated June 4, 1952, there are returned herewith exhibits filed with your applications, dockets DMEA No. 2404 and 2406.

Sincerely yours,

ROBERT E. ADAMS

R.E.A. 6-23-52

Robert E. Adams
Administrative Officer
Defense Minerals Exploration
Administration

Enclosures

REAdams:sh
June 23, 1952

CC: Adm. Reading File
Mails and Files
R. E. Adams

ADAMS BROTHERS COMPANY
MINNESOTA
Duluth 2, Minnesota

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
JUN 9 1952

June 4, 1952

United States Department of the Interior
Defense Minerals Exploration Administration
Washington 25, D. C.

Attention: Mr. Robert E. Adams, Administrative Officer
Re: Dockets Nos DMEA 2404, 2405 and 2406-
Manganese-Crow Wing County, Minnesota

Dear Sir:

We wrote you May 23, 1952 requesting the return of the data on our "Section 29" project.

You sent us the data on NW¼, 29-47-29 Docket No. DMEA 2405, May 27, but you did not include the data under Dockets No. DMEA 2404 or 2406. We would like to have these data.

Yours very truly,

ADAMS BROTHERS COMPANY

By Clyde M Pearce

CMP:aw
cc: Mr. A. B. Needham

FILE COPY
SURNAME:

200

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

MAY 27 1952

Mr. Robert M. Adams
Adams Brothers Company
Duluth 2, Minnesota

Dear Mr. Adams:

This will acknowledge your letter dated May 23, 1952 requesting data submitted by you under Docket Nos. DMEA 2404, 2405, and 2406. In accordance with your request the material is forwarded herewith.

Sincerely yours,

ROBERT E. ADAMS

Robert E. Adams
Administrative Officer
Defense Minerals Exploration
Administration

Enclosure

READams/meb
cc to: Adm.Reading File
Mails & Files Br.

ADAMS BROTHERS COMPANY
MINNESOTA
Duluth 2, Minnesota

May 23, 1952

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 26 1952

Mr. C. O. Mittendorf
Acting Administrator
Defense Minerals Exploration
Administration
Department of the Interior
Washington 25, D. C.

Dear Sir:

Re: Dockets Nos. DMEA 2404, 2405, and 2406 - Manganese
SE¼-SW¼, 20-47-29, NW¼, 29-47-29
SE¼-NE¼, 30-47-29, Minnesota

We have your letter of May 15. Can we receive back again the voluminous sets of data on this "Section 29" project? A great deal of time and effort went into these sets of data and we would like to have them.

Yours very truly,

ADAMS BROTHERS COMPANY

By Robert M. Adams
law

RMA:law

FILE COPY
SURNAME:

Selfridge
Chapman
Nelson
Lemmon
FEJohnson

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

MAY 15 1952

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

Re: Dockets Nos. DMEA 2404, 2405, and 2406 - Manganese
SW¼, 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

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,

C. D. Mittendorf (for) 5/15

Acting Administrator
Defense Minerals Exploration
Administration

TLChapman:FEJohnson:ls
5/13/52

cc: Admn. 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:

Chapman
Selfridge
Lemmon

UNITED STATES
DEPARTMENT OF THE INTERIOR

DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.

C O P Y

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
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 ot 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 the 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.

/S/ 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

ADAMS BROTHERS COMPANY
MINNESOTA
Duluth 2, Minnesota

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 5 1952

May 3, 1952

U. S. Department of Interior
Defense Minerals Exploration Administration
Washington 25, D. C.

Attention: Mr. G. C. Selfridge

Re: Dockets Nos. DMEA 2404, 2405, and 2406 Manganese, Crow Wing County, Minnesota

Gentlemen:

In reply to your letter of April 30, 1952 enclosed find six copies of "Owners' Consent to Lien" signed by Mr. E. P. Scallon and Zontelli Brothers Inc., covering the SE¼-NE¼-Sec., 30-47-29, Crow Wing County, Minnesota. I believe this is covered by your Docket No. 2406.

Enclosed find six copies of the "Owners' Consent to Lien" covering half the ownership of NW¼-Sec. 29-T47N-R29W. Crow Wing County, Minnesota. You will notice the attached copy of a letter from Dr. Fred M. Bogan stating that Miss Agnes Dean, one of the signers of the lease died on March 3, 1952, and that now Mrs. Bogan and Harold Dean are the owners. The other half of this quarter section is owned by Mr. G. E. Whitford. Negotiations are underway to secure his consent to lien. Mr. Whitford has indicated his willingness to consent to lien, but is requesting some impossible money advances as a condition to signing the agreement.

Yours very truly,

ADAMS BROTHERS COMPANY

By Clyde M Pearce

CMP:aw
Enc: 13

FILE COPY
SURNAME:

Chapman
Selfridge

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

APR 30 1952

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

Re: Docket Nos. DMEA 2404, 2405, and 2406 - Manganese
Crow Wing County, Minnesota

Gentlemen:

Your applications for exploration assistance have been reviewed by the Iron and Ferro-Alloy Division of the Defense Minerals Exploration Administration.

We find in regard to Docket Nos. DMEA 2405 and 2406 that you have not submitted the landlord subordination agreements which should accompany an application. For your convenience we are enclosing 14 copies of the agreement. Please return to us six completed copies for each of these two dockets. If you are unable to obtain these agreements, will you please notify us at your earliest convenience?

Further processing of your applications will be held in abeyance until we hear from you.

Sincerely yours,

George C. Selfridge

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

J.N.
4-30-52

Enclosures

TLChapman:GCSelfridge:ls
4/29/52

cc: Admn. Reading File
~~Docket~~
Field Team, Region 5
G. C. Selfridge
T. L. Chapman
M. D. Crittenden, USGS
N. B. Melcher, USBM

140

FILE COPY
SURNAME:

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

April 24, 1952

Memorandum

To: Chief, Iron and Ferroy-Alloy Division

From: Chief Counsel

Subject: Adams Brothers Company, Docket Nos. DMEA 2404, 2405, 2406

I am returning to you herewith your file and the letter signed by you to Adams Brothers Company, which you had apparently submitted to me for surnaming.

It is not possible for this office to surname such incidental correspondence to applicants. The best we can do is to lay down principles which can be followed by division chiefs in carrying out their own correspondence.

In the instant case, your letter seems to have been written with reference to the old contract form and Landlord's Subordination Agreement rather than with reference to the new contract form and the Owner's Consent to Lien. When the new form is used no undertaking on the part of the applicant is required in lieu of the Owner's Consent to Lien. I think, however, that correspondence with respect to the Owner's Consent to Lien should always assume, in the first instance at least, that the applicant will furnish it, rather than indicate that the Government may consent to enter into the contract without it.

J. L. Hofflund

4/25

J. L. Hofflund
Chief Counsel

Attachment
JLHofflund/bjl

Copy to: Mails & Files
J. L. Hofflund
Chron.

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 retained 400

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 property, 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,

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	

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

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,

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	

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

IN REPLY REFER TO:

G-MD-MDC

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

I+T-A files

March 6, 1952

Memorandum

To: George C. Selfridge, DMEA

From: M. D. Crittenden

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

The applicant proposes to spend a total of $100,030 to explore and do some metallurgical testing on three tracts of land in the Cuyuna Range, Minnesota:

No.	Tract T.47 N., R.29 W	No. holes	Ft. churn drilling	Ft. diamond drilling	Cost
2404	SE¼, SW¼ S.20	10	1700	780	$ 26,720
2405	NW¼ S. 29	38	3300	1480	51,070
2406	SE¼, NE¼ S.30	9	1000	740	22,240

These dockets raise a basic question that needs to be answered before proceeding further, i.e.: do we want to explore these areas for material that is clearly not ore now? In long range terms, the problem of our manganese needs can be met only by a two-pronged assault; on both the ore reserve and on the metallurgical problem. It has been argued that neither approach should be pursued until the other problem is solved, but obviously we will never get anywhere that way. I believe that it is desirable to go ahead on the reserve studies until it is clear that we know at least the order of magnitude of the reserves, and have a good idea of the general character of the material involved, as has been done by the Bureau of Mines in Maine. I do not believe we have reached this stage in the Cuyuna area; consequently, it seems to me that additional exploration can be justified on that basis.

However, I do not have sufficient information in this office to determine whether these specific applications make a reasonable and worthwhile contribution to the long-range problem, hence I suggest that they be sent to the Field Team, Region V, to determine: (1) whether the proposed exploration will contribute sufficiently to our knowledge of the

the ore reserves and the metallurgical problems to warrant the cost; (2) whether the proposed exploration is sound from the point of view of the regional geology, and whether the proposed work is adequate to test the possibilities of the areas under consideration.

MDCrittenden:gt

IN REPLY REFER TO:

G-MD-MDC

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

March 6, 1952

One copy released for Sec'y's files

Memorandum

To: George C. Selfridge, DMEA

From: M. D. Crittenden

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

The applicant proposes to spend a total of $100,030 to explore and do some metallurgical testing on three tracts of land in the Cuyuna Range, Minnesota:

No.	Tract T.47 N., R.29 W	No. holes	Ft. churn drilling	Ft. diamond drilling	Cost
2404	SE¼, SW¼ S.20	10	1700	780	$ 26,720
2405	NW¼ S. 29	38	3300	1480	51,070
2406	SE¼, NE¼ S.30	9	1000	740	22,240
					100,030

These dockets raise a basic question that needs to be answered before proceeding further, i.e.: do we want to explore these areas for material that is clearly not ore now? In long range terms, the problem of our manganese needs can be met only by a two-pronged assault; on both the ore reserve and on the metallurgical problem. It has been argued that neither approach should be pursued until the other problem is solved, but obviously we will never get anywhere that way. I believe that it is desirable to go ahead on the reserve studies until it is clear that we know at least the order of magnitude of the reserves, and have a good idea of the general character of the material involved, as has been done by the Bureau of Mines in Maine. I do not believe we have reached this stage in the Cuyuna area; consequently, it seems to me that additional exploration can be justified on that basis.

However, I do not have sufficient information in this office to determine whether these specific applications make a reasonable and worthwhile contribution to the long-range problem, hence I suggest that they be sent to the Field Team, Region V, to determine: (1) whether the proposed exploration will contribute sufficiently to our knowledge of the

the ore reserves and the metallurgical problems to warrant the cost; (2) whether the proposed exploration is sound from the point of view of the regional geology, and whether the proposed work is adequate to test the possibilities of the areas under consideration.

Max S. Crittenden Jr.

EXPLORATION

Subject: DMEA-2404
Re: Exploration Loan
Maroco Mine*
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-2404 and referred to the Iron and Ferro-Alloys Division.

Kindly refer to DMEA-2404 in any future correspondence relating to your application.

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

Sincerely yours,

Robert E. Adams
Acting Administrative Officer

Enclosures (2)

OFFICE OF THE ADMINISTRATOR

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
~~WASHINGTON 25, D.C.~~
Region V
2908 Colfax Avenue South
Minneapolis 8, Minnesota

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
FEB 26 1952

February 26, 1952

Memorandum

To: Operating Committee, Defense Minerals Exploration Administration, Interior Building, Washington 25, D. C.

From: Executive Officer, Field Team, Region V

Subject: Applications for exploration - Adams Brothers Co. Duluth, Minnesota

Under separate cover there are being sent you three copies each of three exploration applications, together with General Technical Data Form MF-100 submitted to this office by the Adams Brothers Co. of Duluth, Minn., to search for manganese on the Cuyuna Range. One copy of each application and the General Technical Data has been retained by this office.

The applications were submitted as three separate projects because of the difficulty of obtaining consent to lien by owners of land in question who object to having their individual holdings encumbered by commitments of others. It is believed an arrangement similar to the guarantee in lieu of subordination agreement given Vinegar Hill Zinc Co. might be satisfactory to Adams Brothers Co. and the three projects would then be as one.

It would be appreciated if these applications be given immediate attention toward processing to contract, because the season is so short on the Minnesota ranges that the applicants would like to start the projects immediately or within the next few weeks.

A. B. Needham
Executive Officer
Field Team, Region V

C
O
P
Y

UNITED STATES
DEPARTMENT OF THE INTERIOR

Bureau of Mines

February 12, 1952

Mr. G. C. Selfridge, Acting Chief
Iron and Ferro-Alloy Division
Defense Minerals Administration
United States Dept. of the Interior
Washington 25, D. C.

Re: Docket No. BMA 1829X - Manganese
Sec. 23, T48, N.R. 27W
Utah Construction Co. and Associates
Aitkin County, Minnesota

Dear Mr. Selfridge:

A progress report covering the results of tests made on the manganese ore referred to in the subject docket has been started. As it will be sometime before it is completed I believe it is advisable to send you a brief summary of the results of this work.

Mineral dressing tests have been made on a total of seven diamond drill cores furnished by the Mining Division. The exact location of each drill hole may be found in the files of the Bureau of Mines, Washington, D. C.

The iron-manganese formation in the area drilled was quite variable in composition as revealed by chemical analysis of the drill cores. Core recovery was irregular and in those instances where the recovery was less than 90 percent, sludge from the hole was included in the composite sample prepared from each core. This type of sample is suitable only for preliminary mineral dressing studies and should be supplemented by trench or pit samples if an accurate estimate of the mineral dressing problems involved are to be determined.

Partial analysis of the composite samples are as follows:

D.D. Hole Number	Assay, percent Mn	Fe	SiO_2
1	3.60	11.8	46.4
2	1.98	11.56	42.1
3	3.08	11.96	52.5
4	3.34	13.34	48.9
5	3.46	13.18	45.8
6	3.30	12.21	52.1
7	2.62	14.96	52.6

The first step in upgrading this material was a simple washing and declining operation on the minus 10 mesh feed. Sieve analyses had shown that a soft clayey fraction of the formation contained less manganese than the harder minerals. The weight recovery, manganese recovery, and assay obtained on each washed concentrate follow:

D.D. Hole number	Wt. recovery, percent	Mn recovery, percent	Assay, percent		
			Mn	Fe	SiO_2
1	63.0	95.1	5.5	15.2	45.7
2	58.7	81.8	2.76	12.44	52.5
3	47.2	76.0	4.96	13.65	52.9
4	57.8	83.1	4.80	14.37	50.6
5	58.5	87.9	5.20	15.42	45.5
6	58.2	91.0	5.16	13.08	53.3
7	55.6	82.3	3.88	16.15	53.8

The highest weight recovery, manganese recovery, and manganese assay were obtained from composite No. 1 which contained no sludge. All sludge recovered with the drill core had been subjected to overgrinding by the diamond drill and undoubtedly more manganese was lost in the washing operation than in the tests which contained no sludge.

Further upgrading of the washed concentrates or sands was obtained by a combination of mineral dressing operations which included the use of a classifier tube, Denver laboratory jig, Wilfley table, heavy density media and froth flotation. In no instance was it possible to separate the manganese from the iron and silica to the degree required for a ferrograde product. However, the results show that a product containing between 22 and 26 percent manganese, 13 to 15 percent iron, and 11.5 to 13.0 percent silica may be produced.

Because of the limited amount of sample available from each core these tests are only indicative of what may be expected and the results should be confirmed by larger scale tests as soon as more material can be obtained. Preliminary results however are very encouraging for the production of a marketable manganiferous product and a reasonable recovery of manganese. The production of a ferrograde product will require further treatment by a leaching process or by a duplex smelting process.

Sincerely yours,

/s/ C. E. Wood

C. E. WOOD, Chief
Metallurgical Division, Reg. V

OWNER'S CONSENT TO LIEN

WHEREAS, the undersigned, as owner, co-owner, lessor, or seller has an interest in certain property in the State of Minnesota, County of Crow Wing, which is the subject of a proposed Exploration Project Contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government", and

1/ Adams Brothers Company

12th Floor Fidelity Bldg.

Duluth 2, Minnesota

hereinafter called the "Operator"; and

WHEREAS, under certain provisions of said Contract which are set forth on the reverse side hereof, the Government will acquire certain rights and equities which do or may conflict with or be adverse to the interest of the undersigned in said property;

NOW THEREFORE, the undersigned, in consideration of said Contract and as an inducement to the Government and Operator to enter into same, undertakes and agrees as follows:

1. The Government's equity in and right to remove facilities, buildings, fixtures, and equipment, as provided in the Contract, shall prevail over and be prior and superior to any conflicting or adverse rights of the undersigned.

2. The Government's percentage royalty on net smelter returns or other net proceeds realized from ore, concentrates, or metal produced within ten (10) years from the date of the Contract, and the Government's lien for the payment of said percentage royalty shall attach to the mineral deposit and the production therefrom, in the amount of the Government's contribution, not in excess of 2/ $ 16,680.00, all upon the terms and conditions set forth in said Contract.

3. The undersigned shall commit no act nor assert any claim that may contravene or conflict with the lien, claim, or rights of the Government under the provisions of the said Contract. This agreement shall be binding upon the heirs, executors, administrators, successors, and assigns of the undersigned.

Dated this 1st day of March, 1952.

SE¼-NE¼-Sec, 30-47-29
Crow Wing County
Minnesota

Edward P. Scallon

ZONTELLI BROTHERS INC.

By Anne V. Stang
Secretary-Treasurer

1/ Insert the name of the Operator as it will appear in the Exploration Project Contract.

2/ Insert the maximum amount of the Government's contribution.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 5 1952

RELEVANT
~~BXXXXXXXX~~ CONTRACT PROVISIONS

Title to and disposition of property. All facilities, buildings, fixtures, equipment, or other items costing more than $50 each, paid for or purchased with funds contributed jointly by the Operator and the Government, shall belong to the Operator and the Government jointly, in proportion to their respective contributions, and upon the termination of the contract, if they have any salvage value, shall be disposed of for their joint account unless the Government, in writing, waives its interest in any such items. The Government may require the dismantling, severance from land, and removal of any such items in order to realize its interest in the salvage value thereof, and the cost of any such removal and of the disposal of the items shall be for the joint account of the parties in proportion to their respective interests.

Repayment by Operator. If, upon the completion of the exploration project or termination of the contract, the Government considers that a discovery or development has resulted from the work from which commercial production of ore may be made, the Government, within 6 months thereafter, shall so certify to the Operator, particularly describing and delimiting its estimate of the discovery or the development. Thereafter, if and as ore is produced as a result of such discovery or development, the Operator and his successor in interest shall be and become obligated to pay to the Government a percentage royalty on the net smelter returns or other net proceeds realized from such ore, concentrates, or metal produced within ten (10) years from the date of this contract, until the total amount contributed by the Government, without interest, is fully repaid or said 10 years have elapsed, whichever occurs first, as follows:

> Of net smelter returns or other net proceeds not in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent.
>
> Of net smelter returns or other net proceeds in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent, plus one-half (1/2) percent for each additional full fifty cents ($0.50) in excess of eight dollars ($8.00) per ton of ore, but not in excess of a maximum of five (5) percent.

This obligation to repay from net returns or proceeds shall be and remain a claim and lien upon the mineral deposit which is the subject of the exploration project and upon any production resulting from such discovery or development, in favor of the Government, until fully paid, or until said 10-year period has elapsed; and this claim and lien and the Government's right to repayment shall survive any termination of the contract, whether by completion of the exploration project or otherwise. This article is not to be construed as imposing any obligation on the Operator or his successor in interest to produce ore from any such discovery or development.

OWNER'S CONSENT TO LIEN

WHEREAS, the undersigned, as owner, co-owner, lessor, or seller has an interest in certain property in the State of Minnesota, County of Crow Wing, which is the subject of a proposed Exploration Project Contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government", and 1/ Adams Brothers Company

12th Floor Fidelity Bldg.

Duluth 2, Minnesota

hereinafter called the "Operator"; and

WHEREAS, under certain provisions of said Contract which are set forth on the reverse side hereof, the Government will acquire certain rights and equities which do or may conflict with or be adverse to the interest of the undersigned in said property;

NOW THEREFORE, the undersigned, in consideration of said Contract and as an inducement to the Government and Operator to enter into same, undertakes and agrees as follows:

1. The Government's equity in and right to remove facilities, buildings, fixtures, and equipment, as provided in the Contract, shall prevail over and be prior and superior to any conflicting or adverse rights of the undersigned.

2. The Government's percentage royalty on net smelter returns or other net proceeds realized from ore, concentrates, or metal produced within ten (10) years from the date of the Contract, and the Government's lien for the payment of said percentage royalty shall attach to the mineral deposit and the production therefrom, in the amount of the Government's contribution, not in excess of 2/ $ 16,680.00, all upon the terms and conditions set forth in said Contract.

3. The undersigned shall commit no act nor assert any claim that may contravene or conflict with the lien, claim, or rights of the Government under the provisions of the said Contract. This agreement shall be binding upon the heirs, executors, administrators, successors, and assigns of the undersigned.

Dated this 1st day of March, 1952.

SE¼-NE¼ - Sec., 30-47-29
Crow Wing County
Minnesota

Edward P. Kelleher

ZONTELLI BROTHERS INC.

By Anne N. Stang
Secretary-Treasurer

1/ Insert the name of the Operator as it will appear in the Exploration Project Contract.

2/ Insert the maximum amount of the Government's contribution.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 5 1952

RELEVANT
XXXXXXXX CONTRACT PROVISIONS

Title to and disposition of property. All facilities, buildings, fixtures, equipment, or other items costing more than $50 each, paid for or purchased with funds contributed jointly by the Operator and the Government, shall belong to the Operator and the Government jointly, in proportion to their respective contributions, and upon the termination of the contract, if they have any salvage value, shall be disposed of for their joint account unless the Government, in writing, waives its interest in any such items. The Government may require the dismantling, severance from land, and removal of any such items in order to realize its interest in the salvage value thereof, and the cost of any such removal and of the disposal of the items shall be for the joint account of the parties in proportion to their respective interests.

Repayment by Operator. If, upon the completion of the exploration project or termination of the contract, the Government considers that a discovery or development has resulted from the work from which commercial production of ore may be made, the Government, within 6 months thereafter, shall so certify to the Operator, particularly describing and delimiting its estimate of the discovery or the development. Thereafter, if and as ore is produced as a result of such discovery or development, the Operator and his successor in interest shall be and become obligated to pay to the Government a percentage royalty on the net smelter returns or other net proceeds realized from such ore, concentrates, or metal produced within ten (10) years from the date of this contract, until the total amount contributed by the Government, without interest, is fully repaid or said 10 years have elapsed, whichever occurs first, as follows:

> Of net smelter returns or other net proceeds not in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent.
>
> Of net smelter returns or other net proceeds in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent, plus one-half (1/2) percent for each additional full fifty cents ($0.50) in excess of eight dollars ($8.00) per ton of ore, but not in excess of a maximum of five (5) percent.

This obligation to repay from net returns or proceeds shall be and remain a claim and lien upon the mineral deposit which is the subject of the exploration project and upon any production resulting from such discovery or development, in favor of the Government, until fully paid, or until said 10-year period has elapsed; and this claim and lien and the Government's right to repayment shall survive any termination of the contract, whether by completion of the exploration project or otherwise. This article is not to be construed as imposing any obligation on the Operator or his successor in interest to produce ore from any such discovery or development.

OWNER'S CONSENT TO LIEN

WHEREAS, the undersigned, as owner, co-owner, lessor, or seller has an interest in certain property in the State of Minnesota, County of Crow Wing, which is the subject of a proposed Exploration Project Contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government", and

1/ Adams Brothers Company

12th Floor Fidelity Bldg.

Duluth 2, Minnesota

hereinafter called the "Operator"; and

WHEREAS, under certain provisions of said Contract which are set forth on the reverse side hereof, the Government will acquire certain rights and equities which do or may conflict with or be adverse to the interest of the undersigned in said property;

NOW THEREFORE, the undersigned, in consideration of said Contract and as an inducement to the Government and Operator to enter into same, undertakes and agrees as follows:

1. The Government's equity in and right to remove facilities, buildings, fixtures, and equipment, as provided in the Contract, shall prevail over and be prior and superior to any conflicting or adverse rights of the undersigned.

2. The Government's percentage royalty on net smelter returns or other net proceeds realized from ore, concentrates, or metal produced within ten (10) years from the date of the Contract, and the Government's lien for the payment of said percentage royalty shall attach to the mineral deposit and the production therefrom, in the amount of the Government's contribution, not in excess of 2/ $ 16,680.00, all upon the terms and conditions set forth in said Contract.

3. The undersigned shall commit no act nor assert any claim that may contravene or conflict with the lien, claim, or rights of the Government under the provisions of the said Contract. This agreement shall be binding upon the heirs, executors, administrators, successors, and assigns of the undersigned.

Dated this 1st day of March, 1952.

SE¼-NE¼-Sec. 30-47-29
Crow Wing County
Minnesota

Edward P. Scanlan

ZONTELLI BROTHERS INC.

By Anne V. Stang
Secretary-Treasurer

1/ Insert the name of the Operator as it will appear in the Exploration Project Contract.

2/ Insert the maximum amount of the Government's contribution.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 5 1952

RELEVANT
~~XXXXXXXX~~ CONTRACT PROVISIONS

Title to and disposition of property. All facilities, buildings, fixtures, equipment, or other items costing more than $50 each, paid for or purchased with funds contributed jointly by the Operator and the Government, shall belong to the Operator and the Government jointly, in proportion to their respective contributions, and upon the termination of the contract, if they have any salvage value, shall be disposed of for their joint account unless the Government, in writing, waives its interest in any such items. The Government may require the dismantling, severance from land, and removal of any such items in order to realize its interest in the salvage value thereof, and the cost of any such removal and of the disposal of the items shall be for the joint account of the parties in proportion to their respective interests.

Repayment by Operator. If, upon the completion of the exploration project or termination of the contract, the Government considers that a discovery or development has resulted from the work from which commercial production of ore may be made, the Government, within 6 months thereafter, shall so certify to the Operator, particularly describing and delimiting its estimate of the discovery or the development. Thereafter, if and as ore is produced as a result of such discovery or development, the Operator and his successor in interest shall be and become obligated to pay to the Government a percentage royalty on the net smelter returns or other net proceeds realized from such ore, concentrates, or metal produced within ten (10) years from the date of this contract, until the total amount contributed by the Government, without interest, is fully repaid or said 10 years have elapsed, whichever occurs first, as follows:

> Of net smelter returns or other net proceeds not in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent.
>
> Of net smelter returns or other net proceeds in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent, plus one-half (1/2) percent for each additional full fifty cents ($0.50) in excess of eight dollars ($8.00) per ton of ore, but not in excess of a maximum of five (5) percent.

This obligation to repay from net returns or proceeds shall be and remain a claim and lien upon the mineral deposit which is the subject of the exploration project and upon any production resulting from such discovery or development, in favor of the Government, until fully paid, or until said 10-year period has elapsed; and this claim and lien and the Government's right to repayment shall survive any termination of the contract, whether by completion of the exploration project or otherwise. This article is not to be construed as imposing any obligation on the Operator or his successor in interest to produce ore from any such discovery or development.

OWNER'S CONSENT TO LIEN

WHEREAS, the undersigned, as owner, co-owner, lessor, or seller has an interest in certain property in the State of Minnesota, County of Crow Wing, which is the subject of a proposed Exploration Project Contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government", and

1/ Adams Brothers Company

12th Floor Fidelity Bldg.

Duluth 2, Minnesota

hereinafter called the "Operator"; and

WHEREAS, under certain provisions of said Contract which are set forth on the reverse side hereof, the Government will acquire certain rights and equities which do or may conflict with or be adverse to the interest of the undersigned in said property;

NOW THEREFORE, the undersigned, in consideration of said Contract and as an inducement to the Government and Operator to enter into same, undertakes and agrees as follows:

1. The Government's equity in and right to remove facilities, buildings, fixtures, and equipment, as provided in the Contract, shall prevail over and be prior and superior to any conflicting or adverse rights of the undersigned.

2. The Government's percentage royalty on net smelter returns or other net proceeds realized from ore, concentrates, or metal produced within ten (10) years from the date of the Contract, and the Government's lien for the payment of said percentage royalty shall attach to the mineral deposit and the production therefrom, in the amount of the Government's contribution, not in excess of 2/ $ 16,680.00, all upon the terms and conditions set forth in said Contract.

3. The undersigned shall commit no act nor assert any claim that may contravene or conflict with the lien, claim, or rights of the Government under the provisions of the said Contract. This agreement shall be binding upon the heirs, executors, administrators, successors, and assigns of the undersigned.

Dated this 1st day of March, 1952.

Edward L. Scallon

SE¼-NE¼-Sec. 30-47-29
Crow Wing County
Minnesota

ZONTELLI BROTHERS INC.

By Anne V. Stang
Secretary-Treasurer

1/ Insert the name of the Operator as it will appear in the Exploration Project Contract.

2/ Insert the maximum amount of the Government's contribution.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 5 1952

RELEVANT
XXXXXXXX CONTRACT PROVISIONS

Title to and disposition of property. All facilities, buildings, fixtures, equipment, or other items costing more than $50 each, paid for or purchased with funds contributed jointly by the Operator and the Government, shall belong to the Operator and the Government jointly, in proportion to their respective contributions, and upon the termination of the contract, if they have any salvage value, shall be disposed of for their joint account unless the Government, in writing, waives its interest in any such items. The Government may require the dismantling, severance from land, and removal of any such items in order to realize its interest in the salvage value thereof, and the cost of any such removal and of the disposal of the items shall be for the joint account of the parties in proportion to their respective interests.

Repayment by Operator. If, upon the completion of the exploration project or termination of the contract, the Government considers that a discovery or development has resulted from the work from which commercial production of ore may be made, the Government, within 6 months thereafter, shall so certify to the Operator, particularly describing and delimiting its estimate of the discovery or the development. Thereafter, if and as ore is produced as a result of such discovery or development, the Operator and his successor in interest shall be and become obligated to pay to the Government a percentage royalty on the net smelter returns or other net proceeds realized from such ore, concentrates, or metal produced within ten (10) years from the date of this contract, until the total amount contributed by the Government, without interest, is fully repaid or said 10 years have elapsed, whichever occurs first, as follows:

> Of net smelter returns or other net proceeds not in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent.
>
> Of net smelter returns or other net proceeds in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent, plus one-half (1/2) percent for each additional full fifty cents ($0.50) in excess of eight dollars ($8.00) per ton of ore, but not in excess of a maximum of five (5) percent.

This obligation to repay from net returns or proceeds shall be and remain a claim and lien upon the mineral deposit which is the subject of the exploration project and upon any production resulting from such discovery or development, in favor of the Government, until fully paid, or until said 10-year period has elapsed; and this claim and lien and the Government's right to repayment shall survive any termination of the contract, whether by completion of the exploration project or otherwise. This article is not to be construed as imposing any obligation on the Operator or his successor in interest to produce ore from any such discovery or development.

OWNER'S CONSENT TO LIEN

WHEREAS, the undersigned, as owner, co-owner, lessor, or seller has an interest in certain property in the State of Minnesota, County of Crow Wing, which is the subject of a proposed Exploration Project Contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government", and

1/ Adams Brothers Company

12th Floor Fidelity Bldg.

Duluth 2, Minnesota

hereinafter called the "Operator"; and

WHEREAS, under certain provisions of said Contract which are set forth on the reverse side hereof, the Government will acquire certain rights and equities which do or may conflict with or be adverse to the interest of the undersigned in said property;

NOW THEREFORE, the undersigned, in consideration of said Contract and as an inducement to the Government and Operator to enter into same, undertakes and agrees as follows:

1. The Government's equity in and right to remove facilities, buildings, fixtures, and equipment, as provided in the Contract, shall prevail over and be prior and superior to any conflicting or adverse rights of the undersigned.

2. The Government's percentage royalty on net smelter returns or other net proceeds realized from ore, concentrates, or metal produced within ten (10) years from the date of the Contract, and the Government's lien for the payment of said percentage royalty shall attach to the mineral deposit and the production therefrom, in the amount of the Government's contribution, not in excess of 2/ $ 16,680.00, all upon the terms and conditions set forth in said Contract.

3. The undersigned shall commit no act nor assert any claim that may contravene or conflict with the lien, claim, or rights of the Government under the provisions of the said Contract. This agreement shall be binding upon the heirs, executors, administrators, successors, and assigns of the undersigned.

Dated this 1st day of March, 1952.

SE¼-NE¼-Sec. 30-47-29
Crow Wing County
Minnesota

Edward P. Larson

ZONTELLI BROTHERS INC.

By Anne V. Stang
Secretary-Treasurer

1/ Insert the name of the Operator as it will appear in the Exploration Project Contract.

2/ Insert the maximum amount of the Government's contribution.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 5 1952

RELEVANT
~~RELEVANT~~ CONTRACT PROVISIONS

Title to and disposition of property. All facilities, buildings, fixtures, equipment, or other items costing more than $50 each, paid for or purchased with funds contributed jointly by the Operator and the Government, shall belong to the Operator and the Government jointly, in proportion to their respective contributions, and upon the termination of the contract, if they have any salvage value, shall be disposed of for their joint account unless the Government, in writing, waives its interest in any such items. The Government may require the dismantling, severance from land, and removal of any such items in order to realize its interest in the salvage value thereof, and the cost of any such removal and of the disposal of the items shall be for the joint account of the parties in proportion to their respective interests.

Repayment by Operator. If, upon the completion of the exploration project or termination of the contract, the Government considers that a discovery or development has resulted from the work from which commercial production of ore may be made, the Government, within 6 months thereafter, shall so certify to the Operator, particularly describing and delimiting its estimate of the discovery or the development. Thereafter, if and as ore is produced as a result of such discovery or development, the Operator and his successor in interest shall be and become obligated to pay to the Government a percentage royalty on the net smelter returns or other net proceeds realized from such ore, concentrates, or metal produced within ten (10) years from the date of this contract, until the total amount contributed by the Government, without interest, is fully repaid or said 10 years have elapsed, whichever occurs first, as follows:

> Of net smelter returns or other net proceeds not in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent.
>
> Of net smelter returns or other net proceeds in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent, plus one-half (1/2) percent for each additional full fifty cents ($0.50) in excess of eight dollars ($8.00) per ton of ore, but not in excess of a maximum of five (5) percent.

This obligation to repay from net returns or proceeds shall be and remain a claim and lien upon the mineral deposit which is the subject of the exploration project and upon any production resulting from such discovery or development, in favor of the Government, until fully paid, or until said 10-year period has elapsed; and this claim and lien and the Government's right to repayment shall survive any termination of the contract, whether by completion of the exploration project or otherwise. This article is not to be construed as imposing any obligation on the Operator or his successor in interest to produce ore from any such discovery or development.

OWNER'S CONSENT TO LIEN

WHEREAS, the undersigned, as owner, co-owner, lessor, or seller has an interest in certain property in the State of Minnesota, County of Crow Wing, which is the subject of a proposed Exploration Project Contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government", and

1/ Adams Brothers Company

12th Floor Fidelity Bldg.

Duluth 2, Minnesota

hereinafter called the "Operator"; and

WHEREAS, under certain provisions of said Contract which are set forth on the reverse side hereof, the Government will acquire certain rights and equities which do or may conflict with or be adverse to the interest of the undersigned in said property;

NOW THEREFORE, the undersigned, in consideration of said Contract and as an inducement to the Government and Operator to enter into same, undertakes and agrees as follows:

1. The Government's equity in and right to remove facilities, buildings, fixtures, and equipment, as provided in the Contract, shall prevail over and be prior and superior to any conflicting or adverse rights of the undersigned.

2. The Government's percentage royalty on net smelter returns or other net proceeds realized from ore, concentrates, or metal produced within ten (10) years from the date of the Contract, and the Government's lien for the payment of said percentage royalty shall attach to the mineral deposit and the production therefrom, in the amount of the Government's contribution, not in excess of 2/ $ 16,680.00, all upon the terms and conditions set forth in said Contract.

3. The undersigned shall commit no act nor assert any claim that may contravene or conflict with the lien, claim, or rights of the Government under the provisions of the said Contract. This agreement shall be binding upon the heirs, executors, administrators, successors, and assigns of the undersigned.

Dated this 1st day of March, 1952.

SE¼-NE¼-Sec. 30-47-29
Crow Wing County
Minnesota

ZONTELLI BROTHERS INC.

By Anne V. Stang
Secretary-Treasurer

1/ Insert the name of the Operator as it will appear in the Exploration Project Contract.

2/ Insert the maximum amount of the Government's contribution.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 5 1952

RELEVANT
~~XXXXXXXXX~~ CONTRACT PROVISIONS

Title to and disposition of property. All facilities, buildings, fixtures, equipment, or other items costing more than $50 each, paid for or purchased with funds contributed jointly by the Operator and the Government, shall belong to the Operator and the Government jointly, in proportion to their respective contributions, and upon the termination of the contract, if they have any salvage value, shall be disposed of for their joint account unless the Government, in writing, waives its interest in any such items. The Government may require the dismantling, severance from land, and removal of any such items in order to realize its interest in the salvage value thereof, and the cost of any such removal and of the disposal of the items shall be for the joint account of the parties in proportion to their respective interests.

Repayment by Operator. If, upon the completion of the exploration project or termination of the contract, the Government considers that a discovery or development has resulted from the work from which commercial production of ore may be made, the Government, within 6 months thereafter, shall so certify to the Operator, particularly describing and delimiting its estimate of the discovery or the development. Thereafter, if and as ore is produced as a result of such discovery or development, the Operator and his successor in interest shall be and become obligated to pay to the Government a percentage royalty on the net smelter returns or other net proceeds realized from such ore, concentrates, or metal produced within ten (10) years from the date of this contract, until the total amount contributed by the Government, without interest, is fully repaid or said 10 years have elapsed, whichever occurs first, as follows:

> Of net smelter returns or other net proceeds not in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent.
>
> Of net smelter returns or other net proceeds in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent, plus one-half (1/2) percent for each additional full fifty cents ($0.50) in excess of eight dollars ($8.00) per ton of ore, but not in excess of a maximum of five (5) percent.

This obligation to repay from net returns or proceeds shall be and remain a claim and lien upon the mineral deposit which is the subject of the exploration project and upon any production resulting from such discovery or development, in favor of the Government, until fully paid, or until said 10-year period has elapsed; and this claim and lien and the Government's right to repayment shall survive any termination of the contract, whether by completion of the exploration project or otherwise. This article is not to be construed as imposing any obligation on the Operator or his successor in interest to produce ore from any such discovery or development.

OWNER'S CONSENT TO LIEN

WHEREAS, the undersigned, as owner, co-owner, lessor, or seller has an interest in certain property in the State of Minnesota, County of Crow Wing, which is the subject of a proposed Exploration Project Contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government", and 1/ Adams Brothers Company, 12th Floor Fidelity Building, Duluth 2, Minnesota

hereinafter called the "Operator"; and

WHEREAS, under certain provisions of said Contract which are set forth on the reverse side hereof, the Government will acquire certain rights and equities which do or may conflict with or be adverse to the interest of the undersigned in said property;

NOW THEREFORE, the undersigned, in consideration of said Contract and as an inducement to the Government and Operator to enter into same, undertakes and agrees as follows:

1. The Government's equity in and right to remove facilities, buildings, fixtures, and equipment, as provided in the Contract, shall prevail over and be prior and superior to any conflicting or adverse rights of the undersigned.

2. The Government's percentage royalty on net smelter returns or other net proceeds realized from ore, concentrates, or metal produced within ten (10) years from the date of the Contract, and the Government's lien for the payment of said percentage royalty shall attach to the mineral deposit and the production therefrom, in the amount of the Government's contribution, not in excess of 2/ $38,302.50, all upon the terms and conditions set forth in said Contract.

3. The undersigned shall commit no act nor assert any claim that may contravene or conflict with the lien, claim, or rights of the Government under the provisions of the said Contract. This agreement shall be binding upon the heirs, executors, administrators, successors, and assigns of the undersigned.

NW¼-Sec, 29-T47N-R29W. Crow Wing County, Minn.

Dated this 6th day of March, 1952

~~Fourth Estate of Alfred J. Dean, Deceased~~

(Agnes Louise Dean) _____

(Helen Dean Bogan) Helen Dean Bogan

(Fred M. Bogan) Fred M. Bogan

(Harold F. Dean) Harold F. Dean

(Margaret Hannum Dean) Margaret Hannum Dean

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 5 1952

1/ Insert the name of the Operator as it will appear in the Exploration Project Contract.

2/ Insert the maximum amount of the Government's contribution.

RELEVANT CONTRACT PROVISIONS

Title to and disposition of property. All facilities, buildings, fixtures, equipment, or other items costing more than $50 each, paid for or purchased with funds contributed jointly by the Operator and the Government, shall belong to the Operator and the Government jointly, in proportion to their respective contributions, and upon the termination of the contract, if they have any salvage value, shall be disposed of for their joint account unless the Government, in writing, waives its interest in any such items. The Government may require the dismantling, severance from land, and removal of any such items in order to realize its interest in the salvage value thereof, and the cost of any such removal and of the disposal of the items shall be for the joint account of the parties in proportion to their respective interests.

Repayment by Operator. If, upon the completion of the exploration project or termination of the contract, the Government considers that a discovery or development has resulted from the work from which commercial production of ore may be made, the Government, within 6 months thereafter, shall so certify to the Operator, particularly describing and delimiting its estimate of the discovery or the development. Thereafter, if and as ore is produced as a result of such discovery or development, the Operator and his successor in interest shall be and become obligated to pay to the Government a percentage royalty on the net smelter returns or other net proceeds realized from such ore, concentrates, or metal produced within ten (10) years from the date of this contract, until the total amount contributed by the Government, without interest, is fully repaid or said 10 years have elapsed, whichever occurs first, as follows:

> Of net smelter returns or other net proceeds not in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent.
>
> Of net smelter returns or other net proceeds in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent, plus one-half (1/2) percent for each additional full fifty cents ($0.50) in excess of eight dollars ($8.00) per ton of ore, but not in excess of a maximum of five (5) percent.

This obligation to repay from net returns or proceeds shall be and remain a claim and lien upon the mineral deposit which is the subject of the exploration project and upon any production resulting from such discovery or development, in favor of the Government, until fully paid, or until said 10-year period has elapsed; and this claim and lien and the Government's right to repayment shall survive any termination of the contract, whether by completion of the exploration project or otherwise. This article is not to be construed as imposing any obligation on the Operator or his successor in interest to produce ore from any such discovery or development.

OWNER'S CONSENT TO LIEN

WHEREAS, the undersigned, as owner, co-owner, lessor, or seller has an interest in certain property in the State of Minnesota, County of Crow Wing, which is the subject of a proposed Exploration Project Contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government", and 1/ Adams Brothers Company, 12th Floor Fidelity Building, Duluth 2, Minnesota.

hereinafter called the "Operator"; and

WHEREAS, under certain provisions of said Contract which are set forth on the reverse side hereof, the Government will acquire certain rights and equities which do or may conflict with or be adverse to the interest of the undersigned in said property;

NOW THEREFORE, the undersigned, in consideration of said Contract and as an inducement to the Government and Operator to enter into same, undertakes and agrees as follows:

1. The Government's equity in and right to remove facilities, buildings, fixtures, and equipment, as provided in the Contract, shall prevail over and be prior and superior to any conflicting or adverse rights of the undersigned.

2. The Government's percentage royalty on net smelter returns or other net proceeds realized from ore, concentrates, or metal produced within ten (10) years from the date of the Contract, and the Government's lien for the payment of said percentage royalty shall attach to the mineral deposit and the production therefrom, in the amount of the Government's contribution, not in excess of 2/ $38,302.50, all upon the terms and conditions set forth in said Contract.

3. The undersigned shall commit no act nor assert any claim that may contravene or conflict with the lien, claim, or rights of the Government under the provisions of the said Contract. This agreement shall be binding upon the heirs, executors, administrators, successors, and assigns of the undersigned.

NW¼-Sec, 29-T47N-R29W. Crow Wing County, Minnesota

Dated this 6th day of March, 1952

~~For the Estate of Alfred J. Dean, Deceased~~

(Agnes Louise Dean) X _____

(Helen Dean Bogan) X Helen Dean Bogan

(Fred M. Bogan) X Fred M. Bogan

(Harold F. Dean) X Harold F. Dean

(Margaret Hannum Dean) Margaret Hannum Dean

DEPARTMENT OF THE INTER
Defense Minerals Administra
RECEIVED
MAY 5 1952

1/ Insert the name of the Operator as it will appear in the Exploration Project Contract.

2/ Insert the maximum amount of the Government's contribution.

RELEVANT CONTRACT PROVISIONS

Title to and disposition of property. All facilities, buildings, fixtures, equipment, or other items costing more than $50 each, paid for or purchased with funds contributed jointly by the Operator and the Government, shall belong to the Operator and the Government jointly, in proportion to their respective contributions, and upon the termination of the contract, if they have any salvage value, shall be disposed of for their joint account unless the Government, in writing, waives its interest in any such items. The Government may require the dismantling, severance from land, and removal of any such items in order to realize its interest in the salvage value thereof, and the cost of any such removal and of the disposal of the items shall be for the joint account of the parties in proportion to their respective interests.

Repayment by Operator. If, upon the completion of the exploration project or termination of the contract, the Government considers that a discovery or development has resulted from the work from which commercial production of ore may be made, the Government, within 6 months thereafter, shall so certify to the Operator, particularly describing and delimiting its estimate of the discovery or the development. Thereafter, if and as ore is produced as a result of such discovery or development, the Operator and his successor in interest shall be and become obligated to pay to the Government a percentage royalty on the net smelter returns or other net proceeds realized from such ore, concentrates, or metal produced within ten (10) years from the date of this contract, until the total amount contributed by the Government, without interest, is fully repaid or said 10 years have elapsed, whichever occurs first, as follows:

> Of net smelter returns or other net proceeds not in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent.
>
> Of net smelter returns or other net proceeds in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent, plus one-half (1/2) percent for each additional full fifty cents ($0.50) in excess of eight dollars ($8.00) per ton of ore, but not in excess of a maximum of five (5) percent.

This obligation to repay from net returns or proceeds shall be and remain a claim and lien upon the mineral deposit which is the subject of the exploration project and upon any production resulting from such discovery or development, in favor of the Government, until fully paid, or until said 10-year period has elapsed; and this claim and lien and the Government's right to repayment shall survive any termination of the contract, whether by completion of the exploration project or otherwise. This article is not to be construed as imposing any obligation on the Operator or his successor in interest to produce ore from any such discovery or development.

OWNER'S CONSENT TO LIEN

WHEREAS, the undersigned, as owner, co-owner, lessor, or seller has an interest in certain property in the State of Minnesota, County of Crow Wing, which is the subject of a proposed Exploration Project Contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government", and 1/ Adams Brothers Company, 12th Floor Fidelity Building, Duluth 2, Minnesota.

hereinafter called the "Operator"; and

WHEREAS, under certain provisions of said Contract which are set forth on the reverse side hereof, the Government will acquire certain rights and equities which do or may conflict with or be adverse to the interest of the undersigned in said property;

NOW THEREFORE, the undersigned, in consideration of said Contract and as an inducement to the Government and Operator to enter into same, undertakes and agrees as follows:

1. The Government's equity in and right to remove facilities, buildings, fixtures, and equipment, as provided in the Contract, shall prevail over and be prior and superior to any conflicting or adverse rights of the undersigned.

2. The Government's percentage royalty on net smelter returns or other net proceeds realized from ore, concentrates, or metal produced within ten (10) years from the date of the Contract, and the Government's lien for the payment of said percentage royalty shall attach to the mineral deposit and the production therefrom, in the amount of the Government's contribution, not in excess of 2/ $ 38,302.50, all upon the terms and conditions set forth in said Contract.

3. The undersigned shall commit no act nor assert any claim that may contravene or conflict with the lien, claim, or rights of the Government under the provisions of the said Contract. This agreement shall be binding upon the heirs, executors, administrators, successors, and assigns of the undersigned.

NW¼-Sec, 29-T47N-R29W. Crow Wing County, Minn.

Dated this 6th day of March, 1952

~~For the Estate of Alfred L. Dean, Deceased~~

(Agnes Louise Dean) _____

(Helen Dean Bogan) Helen Dean Bogan

(Fred M. Bogan) Fred M. Bogan

(Harold F. Dean) Harold F. Dean

(Margaret Hannum Dean) Margaret Hannum Dean

DEPARTMENT OF THE INTE
Defense Minerals Administra
RECEIVED
MAY 5 1952

1/ Insert the name of the Operator as it will appear in the Exploration Project Contract.

2/ Insert the maximum amount of the Government's contribution.

RELEVANT CONTRACT PROVISIONS

Title to and disposition of property. All facilities, buildings, fixtures, equipment, or other items costing more than $50 each, paid for or purchased with funds contributed jointly by the Operator and the Government, shall belong to the Operator and the Government jointly, in proportion to their respective contributions, and upon the termination of the contract, if they have any salvage value, shall be disposed of for their joint account unless the Government, in writing, waives its interest in any such items. The Government may require the dismantling, severance from land, and removal of any such items in order to realize its interest in the salvage value thereof, and the cost of any such removal and of the disposal of the items shall be for the joint account of the parties in proportion to their respective interests.

Repayment by Operator. If, upon the completion of the exploration project or termination of the contract, the Government considers that a discovery or development has resulted from the work from which commercial production of ore may be made, the Government, within 6 months thereafter, shall so certify to the Operator, particularly describing and delimiting its estimate of the discovery or the development. Thereafter, if and as ore is produced as a result of such discovery or development, the Operator and his successor in interest shall be and become obligated to pay to the Government a percentage royalty on the net smelter returns or other net proceeds realized from such ore, concentrates, or metal produced within ten (10) years from the date of this contract, until the total amount contributed by the Government, without interest, is fully repaid or said 10 years have elapsed, whichever occurs first, as follows:

> Of net smelter returns or other net proceeds not in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent.
>
> Of net smelter returns or other net proceeds in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent, plus one-half (1/2) percent for each additional full fifty cents ($0.50) in excess of eight dollars ($8.00) per ton of ore, but not in excess of a maximum of five (5) percent.

This obligation to repay from net returns or proceeds shall be and remain a claim and lien upon the mineral deposit which is the subject of the exploration project and upon any production resulting from such discovery or development, in favor of the Government, until fully paid, or until said 10-year period has elapsed; and this claim and lien and the Government's right to repayment shall survive any termination of the contract, whether by completion of the exploration project or otherwise. This article is not to be construed as imposing any obligation on the Operator or his successor in interest to produce ore from any such discovery or development.

OWNER'S CONSENT TO LIEN

WHEREAS, the undersigned, as owner, co-owner, lessor, or seller has an interest in certain property in the State of Minnesota, County of Crow Wing, which is the subject of a proposed Exploration Project Contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government", and 1/ Adams Brothers Company, 12th Floor Fidelity Building, Duluth 2, Minnesota.

hereinafter called the "Operator"; and

WHEREAS, under certain provisions of said Contract which are set forth on the reverse side hereof, the Government will acquire certain rights and equities which do or may conflict with or be adverse to the interest of the undersigned in said property;

NOW THEREFORE, the undersigned, in consideration of said Contract and as an inducement to the Government and Operator to enter into same, undertakes and agrees as follows:

1. The Government's equity in and right to remove facilities, buildings, fixtures, and equipment, as provided in the Contract, shall prevail over and be prior and superior to any conflicting or adverse rights of the undersigned.

2. The Government's percentage royalty on net smelter returns or other net proceeds realized from ore, concentrates, or metal produced within ten (10) years from the date of the Contract, and the Government's lien for the payment of said percentage royalty shall attach to the mineral deposit and the production therefrom, in the amount of the Government's contribution, not in excess of 2/ $ 38,302.50, all upon the terms and conditions set forth in said Contract.

3. The undersigned shall commit no act nor assert any claim that may contravene or conflict with the lien, claim, or rights of the Government under the provisions of the said Contract. This agreement shall be binding upon the heirs, executors, administrators, successors, and assigns of the undersigned.

NW¼-Sec, 29-T47N-R29W. Crow Wing County, Minn.

Dated this 6th day of March, 1952

~~For the Estate of Alfred J. Dean, Deceased~~

(Agnes Louise Dean) x _____

(Helen Dean Bogan) x Helen Dean Bogan

(Fred M. Bogan) x Fred M. Bogan

(Harold F. Dean) x Harold F. Dean

(Margaret Hannum Dean) Margaret Hannum Dean

DEPARTMENT OF THE INT
Defense Minerals Administ
RECEIVED
MAY 5 1952

1/ Insert the name of the Operator as it will appear in the Exploration Project Contract.

2/ Insert the maximum amount of the Government's contribution.

RELEVANT CONTRACT PROVISIONS

Title to and disposition of property. All facilities, buildings, fixtures, equipment, or other items costing more than $50 each, paid for or purchased with funds contributed jointly by the Operator and the Government, shall belong to the Operator and the Government jointly, in proportion to their respective contributions, and upon the termination of the contract, if they have any salvage value, shall be disposed of for their joint account unless the Government, in writing, waives its interest in any such items. The Government may require the dismantling, severance from land, and removal of any such items in order to realize its interest in the salvage value thereof, and the cost of any such removal and of the disposal of the items shall be for the joint account of the parties in proportion to their respective interests.

Repayment by Operator. If, upon the completion of the exploration project or termination of the contract, the Government considers that a discovery or development has resulted from the work from which commercial production of ore may be made, the Government, within 6 months thereafter, shall so certify to the Operator, particularly describing and delimiting its estimate of the discovery or the development. Thereafter, if and as ore is produced as a result of such discovery or development, the Operator and his successor in interest shall be and become obligated to pay to the Government a percentage royalty on the net smelter returns or other net proceeds realized from such ore, concentrates, or metal produced within ten (10) years from the date of this contract, until the total amount contributed by the Government, without interest, is fully repaid or said 10 years have elapsed, whichever occurs first, as follows:

> Of net smelter returns or other net proceeds not in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent.
>
> Of net smelter returns or other net proceeds in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent, plus one-half (1/2) percent for each additional full fifty cents ($0.50) in excess of eight dollars ($8.00) per ton of ore, but not in excess of a maximum of five (5) percent.

This obligation to repay from net returns or proceeds shall be and remain a claim and lien upon the mineral deposit which is the subject of the exploration project and upon any production resulting from such discovery or development, in favor of the Government, until fully paid, or until said 10-year period has elapsed; and this claim and lien and the Government's right to repayment shall survive any termination of the contract, whether by completion of the exploration project or otherwise. This article is not to be construed as imposing any obligation on the Operator or his successor in interest to produce ore from any such discovery or development.

OWNER'S CONSENT TO LIEN

WHEREAS, the undersigned, as owner, co-owner, lessor, or seller has an interest in certain property in the State of Minnesota, County of Crow Wing, which is the subject of a proposed Exploration Project Contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government", and 1/ Adams Brothers Company, 12th Floor Fidelity Building, Duluth 2, Minnesota

hereinafter called the "Operator"; and

WHEREAS, under certain provisions of said Contract which are set forth on the reverse side hereof, the Government will acquire certain rights and equities which do or may conflict with or be adverse to the interest of the undersigned in said property;

NOW THEREFORE, the undersigned, in consideration of said Contract and as an inducement to the Government and Operator to enter into same, undertakes and agrees as follows:

1. The Government's equity in and right to remove facilities, buildings, fixtures, and equipment, as provided in the Contract, shall prevail over and be prior and superior to any conflicting or adverse rights of the undersigned.

2. The Government's percentage royalty on net smelter returns or other net proceeds realized from ore, concentrates, or metal produced within ten (10) years from the date of the Contract, and the Government's lien for the payment of said percentage royalty shall attach to the mineral deposit and the production therefrom, in the amount of the Government's contribution, not in excess of 2/ $ 38,302.50, all upon the terms and conditions set forth in said Contract.

3. The undersigned shall commit no act nor assert any claim that may contravene or conflict with the lien, claim, or rights of the Government under the provisions of the said Contract. This agreement shall be binding upon the heirs, executors, administrators, successors, and assigns of the undersigned.

NW¼-Sec, 29-T47N-R29W. Crow Wing County, Minn.

Dated this 6th day of March, 1952.

~~For the Estate of Alfred J. Dean, Deceased.~~

(Agnes Louise Dean) X

(Helen Dean Bogan) X Helen Dean Bogan

(Fred M. Bogan) X Fred M. Bogan

(Harold F. Dean) X Harold F. Dean

(Margaret Hannum Dean) X Margaret Hannum Dean

DEPARTMENT OF THE INTER
Defense Minerals Administra
RECEIVED
MAY 5 1952

1/ Insert the name of the Operator as it will appear in the Exploration Project Contract.

2/ Insert the maximum amount of the Government's contribution.

RELEVANT CONTRACT PROVISIONS

Title to and disposition of property. All facilities, buildings, fixtures, equipment, or other items costing more than $50 each, paid for or purchased with funds contributed jointly by the Operator and the Government, shall belong to the Operator and the Government jointly, in proportion to their respective contributions, and upon the termination of the contract, if they have any salvage value, shall be disposed of for their joint account unless the Government, in writing, waives its interest in any such items. The Government may require the dismantling, severance from land, and removal of any such items in order to realize its interest in the salvage value thereof, and the cost of any such removal and of the disposal of the items shall be for the joint account of the parties in proportion to their respective interests.

Repayment by Operator. If, upon the completion of the exploration project or termination of the contract, the Government considers that a discovery or development has resulted from the work from which commercial production of ore may be made, the Government, within 6 months thereafter, shall so certify to the Operator, particularly describing and delimiting its estimate of the discovery or the development. Thereafter, if and as ore is produced as a result of such discovery or development, the Operator and his successor in interest shall be and become obligated to pay to the Government a percentage royalty on the net smelter returns or other net proceeds realized from such ore, concentrates, or metal produced within ten (10) years from the date of this contract, until the total amount contributed by the Government, without interest, is fully repaid or said 10 years have elapsed, whichever occurs first, as follows:

> Of net smelter returns or other net proceeds not in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent.
>
> Of net smelter returns or other net proceeds in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent, plus one-half (1/2) percent for each additional full fifty cents ($0.50) in excess of eight dollars ($8.00) per ton of ore, but not in excess of a maximum of five (5) percent.

This obligation to repay from net returns or proceeds shall be and remain a claim and lien upon the mineral deposit which is the subject of the exploration project and upon any production resulting from such discovery or development, in favor of the Government, until fully paid, or until said 10-year period has elapsed; and this claim and lien and the Government's right to repayment shall survive any termination of the contract, whether by completion of the exploration project or otherwise. This article is not to be construed as imposing any obligation on the Operator or his successor in interest to produce ore from any such discovery or development.

OWNER'S CONSENT TO LIEN

WHEREAS, the undersigned, as owner, co-owner, lessor, or seller has an interest in certain property in the State of Minnesota, County of Crow Wing, which is the subject of a proposed Exploration Project Contract, hereinafter called the "Contract", between the United States of America, hereinafter called the "Government", and 1/ Adams Brothers Company, 12th Floor Fidelity Building, Duluth 2, Minnesota

hereinafter called the "Operator"; and

WHEREAS, under certain provisions of said Contract which are set forth on the reverse side hereof, the Government will acquire certain rights and equities which do or may conflict with or be adverse to the interest of the undersigned in said property;

NOW THEREFORE, the undersigned, in consideration of said Contract and as an inducement to the Government and Operator to enter into same, undertakes and agrees as follows:

1. The Government's equity in and right to remove facilities, buildings, fixtures, and equipment, as provided in the Contract, shall prevail over and be prior and superior to any conflicting or adverse rights of the undersigned.

2. The Government's percentage royalty on net smelter returns or other net proceeds realized from ore, concentrates, or metal produced within ten (10) years from the date of the Contract, and the Government's lien for the payment of said percentage royalty shall attach to the mineral deposit and the production therefrom, in the amount of the Government's contribution, not in excess of 2/ $ 38,302.50, all upon the terms and conditions set forth in said Contract.

3. The undersigned shall commit no act nor assert any claim that may contravene or conflict with the lien, claim, or rights of the Government under the provisions of the said Contract. This agreement shall be binding upon the heirs, executors, administrators, successors, and assigns of the undersigned.

NW¼-Sec, 29-T47N-R29W. Crow Wing County, Minn.

Dated this 6th day of March, 1952

~~For the Estate of Alfred J. Dean, Deceased~~

(Agnes Louise Dean) x _____

(Helen Dean Bogan) x Helen Dean Bogan

(Fred M. Bogan) x Fred M. Bogan

(Harold F. Dean) x Harold F. Dean

(Margaret Hannum Dean) x Margaret Hannum Dean

DEPARTMENT OF THE INTE
Defense Minerals Administr
RECEIVED
MAY 5 1952

1/ Insert the name of the Operator as it will appear in the Exploration Project Contract.

2/ Insert the maximum amount of the Government's contribution.

RELEVANT
CONTRACT PROVISIONS

Title to and disposition of property. All facilities, buildings, fixtures, equipment, or other items costing more than $50 each, paid for or purchased with funds contributed jointly by the Operator and the Government, shall belong to the Operator and the Government jointly, in proportion to their respective contributions, and upon the termination of the contract, if they have any salvage value, shall be disposed of for their joint account unless the Government, in writing, waives its interest in any such items. The Government may require the dismantling, severance from land, and removal of any such items in order to realize its interest in the salvage value thereof, and the cost of any such removal and of the disposal of the items shall be for the joint account of the parties in proportion to their respective interests.

Repayment by Operator. If, upon the completion of the exploration project or termination of the contract, the Government considers that a discovery or development has resulted from the work from which commercial production of ore may be made, the Government, within 6 months thereafter, shall so certify to the Operator, particularly describing and delimiting its estimate of the discovery or the development. Thereafter, if and as ore is produced as a result of such discovery or development, the Operator and his successor in interest shall be and become obligated to pay to the Government a percentage royalty on the net smelter returns or other net proceeds realized from such ore, concentrates, or metal produced within ten (10) years from the date of this contract, until the total amount contributed by the Government, without interest, is fully repaid or said 10 years have elapsed, whichever occurs first, as follows:

> Of net smelter returns or other net proceeds not in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent.
>
> Of net smelter returns or other net proceeds in excess of eight dollars ($8.00) per ton of ore: One and one-half (1-1/2) percent, plus one-half (1/2) percent for each additional full fifty cents ($0.50) in excess of eight dollars ($8.00) per ton of ore, but not in excess of a maximum of five (5) percent.

This obligation to repay from net returns or proceeds shall be and remain a claim and lien upon the mineral deposit which is the subject of the exploration project and upon any production resulting from such discovery or development, in favor of the Government, until fully paid, or until said 10-year period has elapsed; and this claim and lien and the Government's right to repayment shall survive any termination of the contract, whether by completion of the exploration project or otherwise. This article is not to be construed as imposing any obligation on the Operator or his successor in interest to produce ore from any such discovery or development.

DR. FRED M. BOGAN

696 St. John Avenue

Pasadena 2, California

March 6, 1952

Dear Mr. Pearce:

Referring to your letter of February 13, 1952, addressed to Mr. Oslund, which has just been received by Mrs. Bogan, will you please send us a copy of "Owners Consent to Lien," for my file?

In your letter you state that seven copies were sent but only six were received here.

Miss Agnes Dean died on March 3, 1952 so that Mrs. Bogan and Harold Dean are now the owners.

We have signed the Liens and are sending them to Mrs. Dean who is in Mass. She has been urged to return them promptly to Mr. Oslund.

Some time ago I wrote Mr. Hale asking him to send us full information about any prospecting and drilling which you may have done on the property. I have not heard from him.

Very truly yours,

/s/ Fred M. Bogan

COPY

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-2404
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.

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 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 is the owner of the Southeast quarter of the Southwest quarter (SE¼ of SW¼), Section 20, Township 47, Range 29.

(c) The explorations contemplated would be upon the Southeast quarter of the Southwest quarter (SE¼ of SW¼), Section 20, Township 47, Range 29.

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 SE¼-SW¼, Section 20-47-29, should include three (3) structure holes and seven (7) areal holes, which would require approximately seventeen hundred (1700) feet of drilling through surface and seven hundred and eighty (780) feet of drilling in ledge.

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

3. (a) It is estimated that the preliminary exploration program in the SE¼-SW¼, Section 20-47-29, should include three (3) structure holes and seven (7) areal holes, which would require approximately seventeen hundred (1700) feet of drilling through surface and seven hundred and eighty (780) 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.

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 MF-103

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

9. Drilling

1700 ft. surface drilling @ $5.00	$ 8,500	
780 ft. ledge drilling @ $10.50	8,190	
Carbon loss, estimated	920	
		$17,610

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

Geology	
At the rate of $600 a month	1,560
Engineering	
At the rate of $500 a month	1,800
Sampling	
At the rate of $200 a month (Including preparation and filing)	1,000
Assays	
Estimated	650
Metallurgy	
Estimated	2,000
Overhead	
Travel, office, misc.	2,100
	$26,720

Enclosure to Application
Form MF-103

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

10. (a) $6,680.00.

(b) Yes.

Enclosure to Application
Form MF-103

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.

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

Form MF-100
(May 1951)

U. S. DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Form approved.
Budget Bureau No. 42-R1026.

GENERAL TECHNICAL DATA FOR USE UNDER THE DEFENSE PRODUCTION ACT OF 1950

NOT TO BE FILLED IN BY APPLICANT

Docket No. DMEA-2404

Date received 3-3-52

Adams Brothers Company
12th Floor Fidelity Bldg
Duluth 2, Minnesota

Name and address of applicant

Date February 7, 1952

INSTRUCTIONS

This form is to be filed with Defense Minerals Administration, Department of the Interior, Washington 25, D. C. It should be accompanied by appropriate application form when a specific type of Government assistance is requested, in the form of (1) loan, (2) purchase contract, (3) Government guarantee of a private loan, (4) priorities or allocation of mining equipment, and maintenance, repair and operating supplies, and (5) other forms of Government assistance that might arise under the Act. Submit four (4) signed copies of the form and accompanying papers. Name and address should be stamped or typed on each sheet of this form and all accompanying papers. *When a question is inapplicable it should be so stated on the form.* Additional sheets may be attached in answering any questions or in supplying additional information. (IF YOU CANNOT ANSWER A QUESTION, SO STATE.) If a question is answered elsewhere indicate where answered. It is not necessary to answer it again.

GENERAL TECHNICAL DATA

Supply the following information on separate sheets, arranged, numbered, and lettered as indicated:

1. Materials produced: see attached sheets
   (*a*) What are the chief mine, mill, or smelter products?
   (*b*) What are the byproducts, if any?
2. Name(s) and type(s) of mine(s), mill(s), smelter(s), refinery(ies), pit(s), quarry (ies), drilling operation(s). Include old names of property, if any. Show extent of workings, including the following: see attached sheets
   (*a*) Linear feet of shafts.
   (*b*) Linear feet of drifts and crosscuts.
   (*c*) Linear feet of tunnels or adits.
   (*d*) Linear feet of other mine openings (explain briefly).

   Indicate whether mine is flooded or not. Describe any pumping problems. Give size or productive capacity.
3. For each operation listed above supply the following: see attached sheets
   (*a*) Distance and direction from nearest town and shipping point.
   (*b*) Mining district.
   (*c*) Township, Section, Range.
   (*d*) County, State.
4. (*a*) State whether or not property is now in operation, and if in operation, by whom operated. see attached sheets
   (*b*) Are you operating this property as:
   - ☐ Owner.
   - ☐ Lessee.
   - ☐ Contractor.

   DEPARTMENT OF THE INTERIOR
   Defense Minerals Administration
   RECEIVED
   MAR 3 - 1952
5. Number of years in production see attached sheets

   If not in production or operation, estimated date when production will begin
6. Experience of operators: see attached sheets

   Describe the mining and general business experience of (*a*) the applicant, and (*b*) the person or persons who manage the project.
7. History: see attached sheets
   (*a*) Give a statement, as complete as possible, of previous exploration, development, operation, and production of property, with reasons for suspension of operation.
   (*b*) State briefly the known history and production of adjoining and neighboring properties.
   (*c*) Furnish any available (private) reports that may apply to this application, including results of mine examinations, recommended exploration and development, and metallurgical investigations.

8. Names and addresses of Officers, Directors, or Partners, and in addition thereto, the five largest stockholders if applicant is a corporation.

Name and Address (a)	Official Title (If officer is also director indicate by "D") (b)	Total of Annual Salary, Commissions, Bonuses, Etc., Received From Applicant and Affiliates During Last Fiscal Year (c)	Estimated Net Worth Outside of Interest in Applicant (d)	Number of Shares Held in Applicant Corporation: Common (e)	Number of Shares Held in Applicant Corporation: Preferred (f)	Life Insurance Carried for Benefit of Applicant: Amount (g)	Life Insurance Carried for Benefit of Applicant: Net Cash Surrender Value After Loans (h)
Robert M. Adams Fidelity Bldg. Duluth 2, Minnesota	D Pres.-Treas			338	400	35,000	1,625.
Cherrill M. Adams Fidelity Bldg. Duluth 2, Minnesota	D Vice Pres.			20			
Robert M. Adams, Jr. Fidelity Bldg. Duluth 2, Minnesota	D			20			
Malcom M. Adams Fidelity Bldg. Duluth 2, Minnesota	D			20			
Salisbury Adams Fidelity Bldg. Duluth 2, Minnesota	Sec'y D			20			
Laura A. Wilson Fidelity Bldg. Duluth 2, Minnesota	Ass't. Sec						
	Total		x x x x x	418	400	x x x x x	x x x x x

If more lines are needed continue on separate sheet.

9. Capital Stock Issues:

For Corporate Applicants

Item	Authorized (a)	Outstanding (b)	Par Value (c)	Number of Shares Outstanding (d)	Dividend Rate Last Paid* (e)
Common stock	$ 100,000	$ 41,800	$ 100	418	5% none paid
Preferred stock	$ 50,000	$ 40,000	$ 100	400	5% None paid

*Indicate period covered.

10. Production: see attached sheets

Item	Kind of Product (a)	1948 Total (b)	1949 Total (c)	1950 Total (d)	Present Average Monthly (e)
1. Quantity of product mined or quarried (Short, long, metric tons; barrels; pounds; etc.)					
2. Quantity of product processed (specify unit of measure and type of process)					
3. Quantity and grade of product sold or shipped (specify units of measure)					

11. Do you contemplate a change in the present average monthly rate of production? If so, state estimated maximum monthly production and basis of change. see attached sheets

12. Ore or Mineral Reserves: see attached sheets

(a) Describe the ore or mineral deposit briefly. Accompany the application by any available report on the geology and ore reserves.

(*b*) If deposit is other than pla

(1) Submit assay plans and/or sections showing location and size of proved (measured) and probable (indicated) ore or mineral reserve.

(2) State the tonnage (indicate type of ton) and grade of each class of ore reserve, as above, and show how computed. Tabulated total ore reserve as follows:

TOTAL ORE OR MINERAL RESERVES

Ore or Mineral Reserve	Estimated Tons (a)	Metal or Mineral Content Per Ton (Grade) (b)	Gross Value Per Ton (c)	Recoverable Unit Value Per Ton (d)	Estimated Cost of Production Per Ton (e)
Measured (proved)					
Indicated (probable)					

(*c*) If placer:

(1) Give estimated total yardage and average marketable mineral content of each deposit.

(2) Submit map showing location of placer deposit and surrounding area, with all test holes or pits. Submit logs of each hole and test pit with depth and average value of each.

(3) Describe gravel, stating whether fine, medium or coarse; loose, tight, cemented, or frozen, and whether it contains stumps or boulders more than 1 foot in diameter; if so, how large, and in what proportion.

(4) Describe bedrock, giving type (granite, sandstone, shale, etc.) and state whether it is hard or soft, smooth, uneven or rough.

(5) Describe overburden, stating whether loose, tight, or cemented; fine or coarse textured; furnish estimate of average thickness and total amount.

(6) Tabulate the reserves using the form outlined above for ore or mineral reserves.

13. Access Roads: see attached sheets

Give road distances to shipping, supply and residence points, stating kind and condition of roads.

14. Water Supply: see attached sheets

State source and quantity of water available for operations and whether sufficient for all seasons of year.

15. Power: see attached sheets

State amount of power used, rate per hour, and source thereof.

16. Labor: see attached sheets

State number and classes (miners, muckers, millmen, etc.) of men employed during a recent representative payroll period.

17. Equipment and Facilities: see attached sheets

Describe present equipment on the property, including buildings. (State condition.) List major pieces of equipment now owned or controlled and in serviceable condition available for this operation.

18. Are there any particular conditions or circumstances affecting your operations that are not described above? If so, explain.
see attached sheets

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 11, 1952
(Date)

President-Treasurer
(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—63792-1

U.S. Dept. of Int.
Form MF-100
May 1st 1951

February 11, '52

1. Materials produced:
   (a) Adams Brothers Company does not produce any products as such. The company owns mining properties, controls other mining properties under lease. It explores these properties and leases or subleases the ore deposits discovered to active operating mining companies.

   (b) Same Answer as (a) above.

2. Name (s) and type (s) of mine (s), mill (s), smelter (s), refinery (ies), pit (s), quarry (ies), drilling operation (s). Include old names of property, if any. Show extent of workings, including the following:

   The Adams Brothers Company was organized in 1949 to take over the new mining business in Minnesota of Robert M. Adams and carry on further explorations. All the stock of Adams Brothers Company is owned by Mr. Adams and his immediate family, and it is controlled by Robert M. Adams. The "Brothers" are his sons.

   Cuyler Adams, Robert's father discovered the Cuyuna Range, Crow Wing County, Minnesota in 1905, and the Adams family have 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 development of the following Cuyuna Range Mines was largely due to his active participation:

Mine	Production to 1951 in tons*	Reserves 1951 in tons*
Maroco Mine	2,864,598	508,860
Evergreen Mine & Sintering Plant to 1944	3,133,075	no data
Millcrest Group Millcrest Arko Alstead	3,380,783	508,860
Mangan No. 1	357,135	15,486
Joan Mine No. 1	103,480	-7,730**

Adams Brothers Company
Fidelity Building
Duluth 2, Minnesota

U.S. Dept of Int.
Form MF-100
May 1st 1951

Mine	Production to 1951 in tons*	Reserves 1951 in tons*
Louise Mine (Rehabilitation)	383,428	348,609
Rabbit Lake Group (Manganiferous Ore Reserves)	none	no data
Virginia Mine	475,450	no data
	10,725,949	

*Note: Data from "Mining Directory of Minnesota" - 1951 - University of Minnesota

**Note: The Joan Mine over shipped its estimated reserves in 1950. Through the efforts of Mr. Adams, additional ore was discovered and 69,737 tons were shipped in 1951. There are further unestimated reserves to be mined.

Note: These are all open pit mines.

3. (a) Mines 0 to 5 miles from Village of Crosby.
   (b) Cuyuna Range - Minnesota
   (c) Maroco Mine, Lots 1, 2, 3 & 4 & SW-NW Sec 4, T46, R29.
   Evergreen Mine, NE-NW & W½-NE, Sec. 11 & S½-SW-Sec. 2, T.46, R. 29.
   Hillcrest Group, NE¼ & E½ NW¼ & E½ SE¼ Sec. 9, T46, R29.
   Mangan No. 1 Mine, Lots 5 & 6, Sec. 3, T46, R29.
   Joan No. 1 Mine, S½ NE, Sec. 3, T46, R29.
   Louise Mine, Lot 7 & SE-SW, Sec 3, T46, R29.
   Rabbit Lake Group, Sec. 30, T46, R29.
   Virginia Mine, Lot 7, Sec. 4 & NE-SE, Sec. 5, T46, R29.
   (d) Crow Wing County, Minnesota.

4.

Name	Operation	(a) Operated by	(b) Adams Interest
Maroco Mine	yes	Hanna Coal & Ore Corp.	No Interest
Evergreen Mine	yes	Hanna Iron Ore Co.	No Interest
Hillcrest Mine	yes	Hanna Coal & Ore Corp.	Lessee
Mangan No. 1 Mine	yes	Zontelli Bros. Inc.	Part owner & Lessee
Joan No. 1 Mine	yes	Zontelli Bros. Inc.	Lessee
Louise Mine	yes	Hanna Coal & Ore Corp.	Lessee
Rabbit Lake Group	no	Hanna Coal & Ore Corp.	Part Owner
Virginia Mine	yes	Zontelli Bros. Inc.	Part Owner & Lessee

Adams Brothers Company
Fidelity Building
Duluth 2, Minnesota

5.

	Years Production	
Maroco Mine	1921 to date	
Evergreen Mine	1925 to date	
Millorest Mine	1937 to date	under Adams Lease
Mangan No. 1 Mine	1938 to date	" " "
Joan No. 1 Mine	1949 to date	" " "
Louise Mine	1948 to date	" " "
Rabbit Lake Group	Est. Prod. 1954	
Virginia Mine	1948 to date	

6. Experience of operators:
See (2) above for experience of Robert M. Adams as an explorer.

7. History:
The history of Adams Brothers Company and Robert M. Adams, the President, is covered in (2) above, so it is assumed that question (7) refers to the project for which assistance is being requested, and the following statements refer to this project only.

(a) The Section 29 Manganese Area has been explored many times beginning in 1906, with the last explorations in 1950 by Adams Brothers Company. The orebodies on the Cuyuna Range are associated with lines of high magnetic intensity. One of these lines crosses the Section 29 Manganese Area. Data on the explorations accompany the applications for aid to explore in this area for manganese. The data at hand indicate that magnetic surveys and exploration by churn and diamond drilling have been the only mining activity in this immediate area.

(b) There has been no production from any adjoining property or property in the immediate vicinity, but the area is centrally located on the Cuyuna Range where the production of manganese as manganiferous ore is well known. The Section 29 Manganese Area is just north of the strike of the producing mines. A total of 69,897,814 tons of iron and manganiferous ore has been produced on the Cuyuna Range since 1911.

(c) All the available data accompany the applications mentioned in (a) above.

10. Production:
There has been no production from the Section 29 Manganese Area, and the Adams Brothers Company does not produce any thing measured in tons or pounds. See 1 (a) above.

Adams Brothers Company
Fidelity Building
Duluth 2, Minnesota

11. Do you contemplate a change in the present average monthly rate of production? If so, state estimated maximum monthly production and basis of change.
This question does not apply.

12. Ore or Mineral Reserves:
(a) There is a wide band of manganese bearing formation, with indicated width by drilling approximately 6,000 feet, of unknown length. The indicated length by drilling is at least 12,000 feet. There is no indication as to depth as the drilling is shallow, 80 feet to 300 feet, and the dip of the formation appears to be about 70% from the vertical. Data on the geology and explorations accompany this application.
(b) (1) The application is accompanied by maps showing the locations of the drill holes, and logs showing the available assays.
(2) A block 700 feet wide and 2600 feet long, in the Section 29 Manganese Area was estimated, from the drilling data, to contain 11,000,000 tons of material assaying 4.95 per cent manganese and 35.58 per cent iron. The material is classified as slate and schist from the drill cores and cuttings.

The average depth of the drill holes, included in the estimate was 115 feet in glacial drift and 76 feet in ledge. There is no evidence that any of the holes were drilled entirely through the formation.

The data at hand does not warrant an estimate of either measured or indicated ore, but the possibilities would appear to be large.

13. Access Roads:
The Northern Pacific and Soo Line railways have tracks within two miles of the center of the Section 29 Manganese Area.

A good automobile road is maintained by the township to residences on the property. This road connects with County and State hard surfaced roads.

There are ample urban and rural residence points within easy automobile travel distance from the property. The nearest village, Manganese is about 1½ miles from the center of the property. Crosby-Ironton, the largest towns on the Cuyuna Range are about 6 or 7 miles away.

14. Water Supply:
The Mississippi River bounds the area on the north east, Cole Lake is on the west, and Miller Lake is partly within the area on the south. The supply of water is ample for all purposes at all times of the year.

Adams Brothers Company
Fidelity Building
Duluth 2, Minnesota

15. Power:
A 110 KV transmission line of the Minnesota Power & Light Company, connecting the Cuyuna and Mesabi Ranges, crosses the area.

16. Labor:
There is an ample supply of trained labor for all types of mining operations on the Cuyuna Range. Uniform wage scales prevail in all Minnesota mining districts.

17. Equipment and Facilities:
There are no buildings or equipment on the property. No buildings are projected for this project. All drilling will be done under contract by the Adex Corp., who will furnish all necessary equipment and labor.

Mr. Adams has the necessary personnel and equipment in Ironton to handle and store all samples, do engineering and surveying. Geological, mineralogical, and metallurgical studies will be made by and under the supervision of competent consulting engineers and geologists.

18. Mr. Adams has specialized for years in the discovery, exploration, and development of new and marginal mineral deposits, calling on his personal knowledge, and private collection geological data to initiate new projects, and employing specialists to carry on the detail work until a property is placed in the hands of an operating mining company for development and production, or the project is deferred or dropped because of adverse information or conditions. He is especially well qualified to carry this project to the production stage if the explorations prove the possibility of the economic production of manganese.

Adams Brothers Company
Fidelity Building
Duluth 2, Minnesota

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-2404
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.

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 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 is the owner of the Southeast quarter of the Southwest quarter (SE¼ of SW¼), Section 20, Township 47, Range 29.

(c) The explorations contemplated would be upon the Southeast quarter of the Southwest quarter (SE¼ of SW¼), Section 20, Township 47, Range 29.

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 SE¼-SW¼, Section 20-47-29, should include three (3) structure holes and seven (7) areal holes, which would require approximately seventeen hundred (1700) feet of drilling through surface and seven hundred and eighty (780) feet of drilling in ledge.

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

3. (a) It is estimated that the preliminary exploration program in the SE¼-SW¼, Section 20-47-29, should include three (3) structure holes and seven (7) areal holes, which would require approximately seventeen hundred (1700) feet of drilling through surface and seven hundred and eighty (780) 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:

Ø 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.

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 MF-103

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

9. Drilling

1700 ft. surface drilling @ $5.00	$ 8,500	
780 ft. ledge drilling @ $10.50	8,190	
Carbon loss, estimated	920	
		$17,610

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

Geology	
At the rate of $600 a month	1,560
Engineering	
At the rate of $500 a month	1,800
Sampling	
At the rate of $200 a month (Including preparation and filing)	1,000
Assays	
Estimated	650
Metallurgy	
Estimated	2,000
Overhead	
Travel, office, misc.	2,100
	$26,720

Enclosure to Application
Form MF-103

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

10. (a) $6,680.00.

(b) Yes.

Enclosure to Application
Form MF-103

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

Form MF-100
(May 1951)

U. S. DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Form approved.
Budget Bureau No. 42-R1026.

GENERAL TECHNICAL DATA
FOR USE UNDER THE
DEFENSE PRODUCTION ACT OF 1950

NOT TO BE FILLED IN BY APPLICANT

Docket No. DMEA-2404

Date received 3-3-52

Adams Brothers Company
12th Floor Fidelity Bldg.
Duluth 2, Minnesota

Name and address of applicant

Date February 7, 1952

INSTRUCTIONS

This form is to be filed with Defense Minerals Administration, Department of the Interior, Washington 25, D. C. It should be accompanied by appropriate application form when a specific type of Government assistance is requested, in the form of (1) loan, (2) purchase contract, (3) Government guarantee of a private loan, (4) priorities or allocation of mining equipment, and maintenance, repair and operating supplies, and (5) other forms of Government assistance that might arise under the Act. Submit four (4) signed copies of the form and accompanying papers. Name and address should be stamped or typed on each sheet of this form and all accompanying papers. *When a question is inapplicable it should be so stated on the form.* Additional sheets may be attached in answering any questions or in supplying additional information. (IF YOU CANNOT ANSWER A QUESTION, SO STATE.) If a question is answered elsewhere indicate where answered. It is not necessary to answer it again.

GENERAL TECHNICAL DATA

Supply the following information on separate sheets, arranged, numbered, and lettered as indicated:

1. Materials produced: see attached sheets.
   (*a*) What are the chief mine, mill, or smelter products?
   (*b*) What are the byproducts, if any?
2. Name(s) and type(s) of mine(s), mill(s), smelter(s), refinery(ies), pit(s), quarry (ies), drilling operation(s). Include old names of property, if any. Show extent of workings, including the following: see attached sheets
   (*a*) Linear feet of shafts.
   (*b*) Linear feet of drifts and crosscuts.
   (*c*) Linear feet of tunnels or adits.
   (*d*) Linear feet of other mine openings (explain briefly).

   Indicate whether mine is flooded or not. Describe any pumping problems. Give size or productive capacity.
3. For each operation listed above supply the following: see attached sheets
   (*a*) Distance and direction from nearest town and shipping point.
   (*b*) Mining district.
   (*c*) Township, Section, Range.
   (*d*) County, State.
4. (*a*) State whether or not property is now in operation, and if in operation, by whom operated. see attached sheets
   (*b*) Are you operating this property as:
   - ☐ Owner.
   - ☐ Lessee.
   - ☐ Contractor.
5. Number of years in production see attached sheets

   If not in production or operation, estimated date when production will begin
6. Experience of operators: see attached sheets

   Describe the mining and general business experience of (*a*) the applicant, and (*b*) the person or persons who manage the project.
7. History: see attached sheets
   (*a*) Give a statement, as complete as possible, of previous exploration, development, operation, and production of property, with reasons for suspension of operation.
   (*b*) State briefly the known history and production of adjoining and neighboring properties.
   (*c*) Furnish any available (private) reports that may apply to this application, including results of mine examinations, recommended exploration and development, and metallurgical investigations.

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAR 3 1952

16—63792-2

8. Names and addresses of Officers, Directors, or Partners, and in addition thereto, the five largest stockholders if applicant is a corporation.

Name and Address (a)	Official Title (If officer is also director indicate by "D") (b)	Total of Annual Salary, Commissions, Bonuses, Etc., Received From Applicant and Affiliates During Last Fiscal Year (c)	Estimated Net Worth Outside of Interest in Applicant (d)	Number of Shares Held in Applicant Corporation: Common (e)	Number of Shares Held in Applicant Corporation: Preferred (f)	Life Insurance Carried for Benefit of Applicant: Amount (g)	Life Insurance Carried for Benefit of Applicant: Net Cash Surrender Value After Loans (h)
Robert M. Adams Fidelity Bldg. Duluth, 2, Minnesota	D Pres.-Treas			338	400	35,000	1,625.
Cherrill M. Adams Fidelity Bldg. Duluth 2, Minnesota	D Vice Pres.			20			
Robert M. Adams, Jr. Fidelity Bldg. Duluth 2, Minnesota	D			20			
Malcom M. Adams Fidelity Bldg. Duluth 2, Minnesota	D			20			
Salisbury Adams Fidelity Bldg. Duluth 2, Minnesota	Sec'y D			20			
Laura A. Wilson Fidelity Bldg. Duluth, 2, Minnesota	Ass't. Sec.						
	Total		x x x x x	418	400	x x x x x	x x x x x

If more lines are needed continue on separate sheet.

9. Capital Stock Issues:

For Corporate Applicants

Item	Authorized (a)	Outstanding (b)	Par Value (c)	Number of Shares Outstanding (d)	Dividend Rate Last Paid* (e)
Common stock	$ 100,000	$ 41,800	$ 100	418	5% none paid
Preferred stock	$ 50,000	$ 40,000	$ 100	400	5% none paid

*Indicate period covered.

10. Production: see attached sheets

Item	Kind of Product (a)	1948 Total (b)	1949 Total (c)	1950 Total (d)	Present Average Monthly (e)
1. Quantity of product mined or quarried (Short, long, metric tons; barrels; pounds; etc.)					
2. Quantity of product processed (specify unit of measure and type of process)					
3. Quantity and grade of product sold or shipped (specify units of measure)					

11. Do you contemplate a change in the present average monthly rate of production? If so, state estimated maximum monthly production and basis of change. see attached sheets

12. Ore or Mineral Reserves: see attached sheets

(a) Describe the ore or mineral deposit briefly. Accompany the application by any available report on the geology and ore reserves.

(*b*) If deposit is other than placer:

(1) Submit assay plans and/or sections showing location and size of proved (measured) and probable (indicated) ore or mineral reserve.

(2) State the tonnage (indicate type of ton) and grade of each class of ore reserve, as above, and show how computed. Tabulated total ore reserve as follows:

TOTAL ORE OR MINERAL RESERVES

Ore or Mineral Reserve	Estimated Tons (a)	Metal or Mineral Content Per Ton (Grade) (b)	Gross Value Per Ton (c)	Recoverable Unit Value Per Ton (d)	Estimated Cost of Production Per Ton (e)
Measured (proved)					
Indicated (probable)					

(*c*) If placer:

(1) Give estimated total yardage and average marketable mineral content of each deposit.

(2) Submit map showing location of placer deposit and surrounding area, with all test holes or pits. Submit logs of each hole and test pit with depth and average value of each.

(3) Describe gravel, stating whether fine, medium or coarse; loose, tight, cemented, or frozen, and whether it contains stumps or boulders more than 1 foot in diameter; if so, how large, and in what proportion.

(4) Describe bedrock, giving type (granite, sandstone, shale, etc.) and state whether it is hard or soft, smooth, uneven or rough.

(5) Describe overburden, stating whether loose, tight, or cemented; fine or coarse textured; furnish estimate of average thickness and total amount.

(6) Tabulate the reserves using the form outlined above for ore or mineral reserves.

13. Access Roads: see attached sheets

Give road distances to shipping, supply and residence points, stating kind and condition of roads.

14. Water Supply: see attached sheets

State source and quantity of water available for operations and whether sufficient for all seasons of year.

15. Power: see attached sheets

State amount of power used, rate per hour, and source thereof.

16. Labor: see attached sheets

State number and classes (miners, muckers, millmen, etc.) of men employed during a recent representative payroll period.

17. Equipment and Facilities: see attached sheets

Describe present equipment on the property, including buildings. (State condition.) List major pieces of equipment now owned or controlled and in serviceable condition available for this operation.

18. Are there any particular conditions or circumstances affecting your operations that are not described above? If so, explain.
see attached sheets

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 11, 1952
(Date)

President-Treasurer
(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—63792-1

U.S. Dept. of Int.
Form MF-100
May 1st 1951

February 11, '52

1. Materials produced:
   (a) Adams Brothers Company does not produce any products as such. The company owns mining properties, controls other mining properties under lease. It explores these properties and leases or subleases the ore deposits discovered to active operating mining companies.

   (b) Same Answer as (a) above.

2. Name (s) and type (s) of mine (s), mill (s), smelter (s), refinery (ies), pit (s), quarry (ies), drilling operation (s). Include old names of property, if any. Show extent of workings, including the following:

   The Adams Brothers Company was organized in 1949 to take over the new mining business in Minnesota of Robert M. Adams and carry on further explorations. All the stock of Adams Brothers Company is owned by Mr. Adams and his immediate family, and it is controlled by Robert M. Adams. The "Brothers" are his sons.

   Cuyler Adams, Robert's father discovered the Cuyuna Range, Crow Wing County, Minnesota in 1905, and the Adams family have 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 development of the following Cuyuna Range Mines was largely due to his active participation:

Mine	Production to 1951 in tons*	Reserves 1951 in tons*
Maroco Mine	2,864,598	508,860
Evergreen Mine & Sintering Plant to 1944	3,133,075	no data
Hillcrest Group Hillcrest Arko Alstead	3,390,783	508,860
Mangan No. 1	357,135	15,486
Joan Mine No. 1	103,480	-7,730**

Adams Brothers Company
Fidelity Building
Duluth 2, Minnesota

U.S. Dept of Int.
Form MF-100
May 1st 1951

Mine	Production to 1951 in tons*	Reserves 1951 in tons*
Louise Mine (Rehabilitation)	383,428	348,609
Rabbit Lake Group (Manganiferous Ore Reserves)	none	no data
Virginia Mine	475,450	no data
	10,725,949	

*Note: Data from "Mining Directory of Minnesota" - 1951 - University of Minnesota

**Note: The Joan Mine over shipped its estimated reserves in 1950. Through the efforts of Mr. Adams, additional ore was discovered and 89,737 tons were shipped in 1951. There are further unestimated reserves to be mined.

Note: These are all open pit mines.

3. (a) Mines 0 to 5 miles from Village of Crosby.
   (b) Cuyuna Range - Minnesota
   (c) Maroco Mine, Lots 1, 2, 3 & 4 & SW-NW Sec 4, T46, R29.
   Evergreen Mine, NE-NW & W½-NE, Sec. 11 & S½-SW-Sec. 2, T.46, R. 29.
   Hillcrest Group, NE¼ & E½ NW¼ & N½ SW¼ Sec. 9, T46, R29
   Mangan No. 1 Mine, Lots 5 & 6, Sec. 3, T46, R29.
   Joan No. 1 Mine, S½ NE, Sec. 3, T46, R29.
   Louise Mine, Lot 7 & SE-SW, Sec 3, T46, R29.
   Rabbit Lake Group, Sec. 30, T46, R29.
   Virginia Mine, Lot 7, Sec. 4 & NE-SE, Sec. 5, T46, R29.
   (d) Crow Wing County, Minnesota.

4.

Name	Operation	(a) Operated by	(b) Adams Interest
Maroco Mine	yes	Hanna Coal & Ore Corp.	No Interest
Evergreen Mine	yes	Hanna Iron Ore Co.	No Interest
Hillcrest Mine	yes	Hanna Coal & Ore Corp.	Lessee
Mangan No. 1 Mine	yes	Zontelli Bros. Inc.	Part owner & Lessee
Joan No. 1 Mine	yes	Zontelli Bros. Inc.	Lessee
Louise Mine	yes	Hanna Coal & Ore Corp.	Lessee
Rabbit Lake Group	no	Hanna Coal & Ore Corp.	Part Owner
Virginia Mine	yes	Zontelli Bros. Inc.	Part Owner & Lessee

Adams Brothers Company
Fidelity Building
Duluth 2, Minnesota

5.

	Years Production	
Maroco Mine	1921 to date	
Evergreen Mine	1925 to date	
Hillcrest Mine	1937 to date	under Adams Lease
Mangan No. 1 Mine	1938 to date	" " "
Joan No. 1 Mine	1949 to date	" " "
Louise Mine	1946 to date	" " "
Rabbit Lake Group	Est. Prod. 1954	
Virginia Mine	1948 to date	

6. Experience of operators:
See (2) above for experience of Robert M. Adams as an explorer.

7. History:
The history of Adams Brothers Company and Robert M. Adams, the President, is covered in (2) above, so it is assumed that question (7) refers to the project for which assistance is being requested, and the following statements refer to this project only.

(a) The Section 29 Manganese Area has been explored many times beginning in 1906, with the last explorations in 1950 by Adams Brothers Company. The orebodies on the Cuyuna Range are associated with lines of high magnetic intensity. One of these lines crosses the Section 29 Manganese Area. Data on the explorations accompany the applications for aid to explore in this area for manganese. The data at hand indicate that magnetic surveys and exploration by churn and diamond drilling have been the only mining activity in this immediate area.

(b) There has been no production from any adjoining property or property in the immediate vicinity, but the area is centrally located on the Cuyuna Range where the production of manganese as manganiferous ore is well known. The Section 29 Manganese Area is just north of the strike of the producing mines. A total of 69,897,814 tons of iron and manganiferous ore has been produced on the Cuyuna Range since 1911.

(c) All the available data accompany the applications mentioned in (a) above.

10. Production:
There has been no production from the Section 29 Manganese Area, and the Adams Brothers Company does not produce any thing measured in tons or pounds. See 1 (a) above.

Adams Brothers Company
Fidelity Building
Duluth 2, Minnesota

11. Do you contemplate a change in the present average monthly rate of production? If so, state estimated maximum monthly production and basis of change.
This question does not apply.

12. Ore or Mineral Reserves:
(a) There is a wide band of manganese bearing formation, with indicated width by drilling approximately 6,000 feet, of unknown length. The indicated length by drilling is at least 12,000 feet. There is no indication as to depth as the drilling is shallow, 80 feet to 300 feet, and the dip of the formation appears to be about 70% from the vertical. Data on the geology and explorations accompany this application.
(b) (1) The application is accompanied by maps showing the locations of the drill holes, and logs showing the available assays.
(2) A block 700 feet wide and 2600 feet long, in the Section 29 Manganese Area was estimated, from the drilling data, to contain 11,000,000 tons of material assaying 4.85 per cent manganese and 35.58 per cent iron. The material is classified as slate and schist from the drill cores and cuttings.

The average depth of the drill holes, included in the estimate was 115 feet in glacial drift and 73 feet in ledge. There is no evidence that any of the holes were drilled entirely through the formation.

The data at hand does not warrant an estimate of either measured or indicated ore, but the possibilities would appear to be large.

13. Access Roads:
The Northern Pacific and Soo Line railways have tracks within two miles of the center of the Section 29 Manganese Area.

A good automobile road is maintained by the township to residences on the property. This road connects with County and State hard surfaced roads.

There are ample urban and rural residence points within easy automobile travel distance from the property. The nearest village, Manganese is about 1½ miles from the center of the property. Crosby-Ironton, the largest towns on the Cuyuna Range are about 6 or 7 miles away.

14. Water Supply:
The Mississippi River bounds the area on the north east, Cole Lake is on the west, and Miller Lake is partly within the area on the south. The supply of water is ample for all purposes at all times of the year.

Adams Brothers Company
Fidelity Building
Duluth 2, Minnesota

15. Power:
A 110 KV transmission line of the Minnesota Power & Light Company, connecting the Cuyuna and Mesabi Ranges, crosses the area.

16. Labor:
There is an ample supply of trained labor for all types of mining operations on the Cuyuna Range. Uniform wage scales prevail in all Minnesota mining districts.

17. Equipment and Facilities:
There are no buildings or equipment on the property. No buildings are projected for this project. All drilling will be done under contract by the Adex Corp., who will furnish all necessary equipment and labor.

Mr. Adams has the necessary personnel and equipment in Ironton to handle and store all samples, do engineering and surveying. Geological, mineralogical, and metallurgical studies will be made by and under the supervision of competent consulting engineers and geologists.

18. Mr. Adams has specialized for years in the discovery, exploration, and development of new and marginal mineral deposits, calling on his personal knowledge, and private collection geological data to initiate new projects, and employing specialists to carry on the detail work until a property is placed in the hands of an operating mining company for development and production, or the project is deferred or dropped because of adverse information or conditions. He is especially well qualified to carry this project to the production stage if the explorations prove the possibility of the economic production of manganese.

Adams Brothers Company
Fidelity Building
Duluth 2, Minnesota

Form MF-100
(May 1951)

U. S. DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Form approved.
Budget Bureau No. 42-R1026.

GENERAL TECHNICAL DATA FOR USE UNDER THE DEFENSE PRODUCTION ACT OF 1950

NOT TO BE FILLED IN BY APPLICANT

Docket No. DMEA-2404

Date received 3-3-52

Adams Brothers Company
12th Floor Fidelity Bldg
Duluth 2, Minnesota

Name and address of applicant

Date February 7, 1952

INSTRUCTIONS

This form is to be filed with Defense Minerals Administration, Department of the Interior, Washington 25, D. C. It should be accompanied by appropriate application form when a specific type of Government assistance is requested, in the form of (1) loan, (2) purchase contract, (3) Government guarantee of a private loan, (4) priorities or allocation of mining equipment, and maintenance, repair and operating supplies, and (5) other forms of Government assistance that might arise under the Act. Submit four (4) signed copies of the form and accompanying papers. Name and address should be stamped or typed on each sheet of this form and all accompanying papers. *When a question is inapplicable it should be so stated on the form.* Additional sheets may be attached in answering any questions or in supplying additional information. (IF YOU CANNOT ANSWER A QUESTION, SO STATE.) If a question is answered elsewhere indicate where answered. It is not necessary to answer it again.

GENERAL TECHNICAL DATA

Supply the following information on separate sheets, arranged, numbered, and lettered as indicated:

1. Materials produced: see attached sheets
   (*a*) What are the chief mine, mill, or smelter products?
   (*b*) What are the byproducts, if any?
2. Name(s) and type(s) of mine(s), mill(s), smelter(s), refinery(ies), pit(s), quarry (ies), drilling operation(s). Include old names of property, if any. Show extent of workings, including the following: see attached sheets
   (*a*) Linear feet of shafts.
   (*b*) Linear feet of drifts and crosscuts.
   (*c*) Linear feet of tunnels or adits.
   (*d*) Linear feet of other mine openings (explain briefly).

   Indicate whether mine is flooded or not. Describe any pumping problems. Give size or productive capacity.
3. For each operation listed above supply the following: see attached sheets
   (*a*) Distance and direction from nearest town and shipping point.
   (*b*) Mining district.
   (*c*) Township, Section, Range.
   (*d*) County, State.
4. (*a*) State whether or not property is now in operation, and if in operation, by whom operated. see attached sheets
   (*b*) Are you operating this property as:
   - ☐ Owner.
   - ☐ Lessee.
   - ☐ Contractor.

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

5. Number of years in production see attached sheets
   If not in production or operation, estimated date when production will begin
6. Experience of operators: see attached sheets
   Describe the mining and general business experience of (*a*) the applicant, and (*b*) the person or persons who manage the project.
7. History: see attached sheets
   (*a*) Give a statement, as complete as possible, of previous exploration, development, operation, and production of property, with reasons for suspension of operation.
   (*b*) State briefly the known history and production of adjoining and neighboring properties.
   (*c*) Furnish any available (private) reports that may apply to this application, including results of mine examinations, recommended exploration and development, and metallurgical investigations.

8. Names and addresses of Officers, Directors, or Partners, and in addition thereto, the five largest stockholders if applicant is a corporation.

Name and Address (a)	Official Title (If officer is also director indicate by "D") (b)	Total of Annual Salary, Commissions, Bonuses, Etc., Received From Applicant and Affiliates During Last Fiscal Year (c)	Estimated Net Worth Outside of Interest in Applicant (d)	Number of Shares Held in Applicant Corporation: Common (e)	Number of Shares Held in Applicant Corporation: Preferred (f)	Life Insurance Carried for Benefit of Applicant: Amount (g)	Life Insurance Carried for Benefit of Applicant: Net Cash Surrender Value After Loans (h)
Robert M. Adams Fidelity Bldg. Duluth 2, Minnesota	D Pres.-Treas			338	400	35,000	1,625.
Cherrill M. Adams Fidelity Bldg. Duluth 2, Minnesota	D Vice Pres.			20			
Robert M. Adams, Jr. Fidelity Bldg. Duluth 2, Minnesota	D			20			
Malcom M. Adams Fidelity Bldg. Duluth 2, Minnesota	D			20			
Salisbury Adams Fidelity Bldg. Duluth 2, Minnesota	Sec'y D			20			
Laura A. Wilson Fidelity Bldg. Duluth 2, Minnesota	Ass't. Sec.						
	Total		x x x x x	418	400	x x x x x	x x x x x

If more lines are needed continue on separate sheet.

9. Capital Stock Issues:

For Corporate Applicants

Item	Authorized (a)	Outstanding (b)	Par Value (c)	Number of Shares Outstanding (d)	Dividend Rate Last Paid* (e)
Common stock	$ 100,000	$ 41,800	$ 100	418	5% none paid
Preferred stock	$ 50,000	$ 40,000	$ 100	400	5% none paid

*Indicate period covered.

10. Production: see attached sheets

Item	Kind of Product (a)	1948 Total (b)	1949 Total (c)	1950 Total (d)	Present Average Monthly (e)
1. Quantity of product mined or quarried (Short, long, metric tons; barrels; pounds; etc.)					
2. Quantity of product processed (specify unit of measure and type of process)					
3. Quantity and grade of product sold or shipped (specify units of measure)					

11. Do you contemplate a change in the present average monthly rate of production? If so, state estimated maximum monthly production and basis of change. see attached sheets

12. Ore or Mineral Reserves: see attached sheets

(a) Describe the ore or mineral deposit briefly. Accompany the application by any available report on the geology and ore reserves.

(*b*) If deposit is other than placer:

(1) Submit assay plans and/or sections showing location and size of proved (measured) and probable (indicated) ore or mineral reserve.

(2) State the tonnage (indicate type of ton) and grade of each class of ore reserve, as above, and show how computed. Tabulated total ore reserve as follows:

TOTAL ORE OR MINERAL RESERVES

Ore or Mineral Reserve	Estimated Tons (a)	Metal or Mineral Content Per Ton (Grade) (b)	Gross Value Per Ton (c)	Recoverable Unit Value Per Ton (d)	Estimated Cost of Production Per Ton (e)
Measured (proved)					
Indicated (probable)					

(*c*) If placer:

(1) Give estimated total yardage and average marketable mineral content of each deposit.

(2) Submit map showing location of placer deposit and surrounding area, with all test holes or pits. Submit logs of each hole and test pit with depth and average value of each.

(3) Describe gravel, stating whether fine, medium or coarse; loose, tight, cemented, or frozen, and whether it contains stumps or boulders more than 1 foot in diameter; if so, how large, and in what proportion.

(4) Describe bedrock, giving type (granite, sandstone, shale, etc.) and state whether it is hard or soft, smooth, uneven or rough.

(5) Describe overburden, stating whether loose, tight, or cemented; fine or coarse textured; furnish estimate of average thickness and total amount.

(6) Tabulate the reserves using the form outlined above for ore or mineral reserves.

13. Access Roads: see attached sheets

Give road distances to shipping, supply and residence points, stating kind and condition of roads.

14. Water Supply: see attached sheets

State source and quantity of water available for operations and whether sufficient for all seasons of year.

15. Power: see attached sheets

State amount of power used, rate per hour, and source thereof.

16. Labor: see attached sheets

State number and classes (miners, muckers, millmen, etc.) of men employed during a recent representative payroll period.

17. Equipment and Facilities: see attached sheets

Describe present equipment on the property, including buildings. (State condition.) List major pieces of equipment now owned or controlled and in serviceable condition available for this operation.

18. Are there any particular conditions or circumstances affecting your operations that are not described above? If so, explain.
see attached sheets

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 Robert Madsen
(Signature of authorized official)

February 11, 1952
(Date)

President-Treasurer
(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—63792-1

U.S. Dept. of Int.
Form MF-100
May 1st 1951

ADAMS BROTHERS COMPANY

MINNESOTA

Duluth 2, Minnesota

February 11, '52

1. Materials produced:
   (a) Adams Brothers Company does not produce any products as such. The company owns mining properties, controls other mining properties under lease. It explores these properties and leases or subleases the ore deposits discovered to active operating mining companies.

   (b) Same Answer as (a) above.

2. Name (s) and type (s) of mine (s), mill (s), smelter (s), refinery (ies), pit (s), quarry (ies), drilling operation (s). Include old names of property, if any. Show extent of workings, including the following:

   The Adams Brothers Company was organized in 1949 to take over the new mining business in Minnesota of Robert M. Adams and carry on further explorations. All the stock of Adams Brothers Company is owned by Mr. Adams and his immediate family, and it is controlled by Robert M. Adams. The "Brothers" are his sons.

   Cuyler Adams, Robert's father discovered the Cuyuna Range, Crow Wing County, Minnesota in 1905, and the Adams family have 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 development of the following Cuyuna Range Mines was largely due to his active participation:

Mine	Production to 1951 in tons*	Reserves 1951 in tons*
Maroco Mine	2,864,598	508,860
Evergreen Mine & Sintering Plant to 1944	3,133,075	no data
Hillcrest Group Hillcrest Arko Alstead	3,390,783	508,860
Mangan No. 1	357,135	15,486
Joan Mine No. 1	103,480	-7,730**

U.S. Dept of Int.
Form MF-100
May 1st 1951

Mine	Production to 1951 in tons*	Reserves 1951 in tons*
Louise Mine (Rehabilitation)	383,428	348,609
Rabbit Lake Group (Manganiferous Ore Reserves)	none	no data
Virginia Mine	475,450	no data
	10,725,949	

*Note: Data from "Mining Directory of Minnesota" - 1951 - University of Minnesota

**Note: The Joan Mine over shipped its estimated reserves in 1950. Through the efforts of Mr. Adams, additional ore was discovered and 69,737 tons were shipped in 1951. There are further unestimated reserves to be mined.

Note: These are all open pit mines.

3. (a) Mines 0 to 5 miles from Village of Crosby.
(b) Cuyuna Range - Minnesota
(c) Maroco Mine, Lots 1, 2, 3 & 4 & SW-NW Sec 4, T46, R29.
Evergreen Mine, NE-NW & W½-NE, Sec. 11 & S½-SW-Sec. 2, T.46, R. 29.
Hillcrest Group, NE¼ & E½ NW¼ & E½ SE¼ Sec. 9, T46, R29.
Mangan No. 1 Mine, Lots 5 & 6, Sec. 3, T46, R29.
Joan No. 1 Mine, S½ NE, Sec. 3, T46, R29.
Louise Mine, Lot 7 & SE-SW, Sec 3, T46, R29.
Rabbit Lake Group, Sec. 30, T46, R29.
Virginia Mine, Lot 7, Sec. 4 & NE-SE, Sec. 5, T46, R29.
(d) Crow Wing County, Minnesota.

4.

Name	Operation	(a) Operated by	(b) Adams Interest
Maroco Mine	yes	Hanna Coal & Ore Corp.	No Interest
Evergreen Mine	yes	Hanna Iron Ore Co.	No Interest
Hillcrest Mine	yes	Hanna Coal & Ore Corp.	Lessee
Mangan No. 1 Mine	yes	Zontelli Bros. Inc.	Part owner & Lessee
Joan No. 1 Mine	yes	Zontelli Bros. Inc.	Lessee
Louise Mine	yes	Hanna Coal & Ore Corp.	Lessee
Rabbit Lake Group	no	Hanna Coal & Ore Corp.	Part Owner
Virginia Mine	yes	Zontelli Bros. Inc.	Part Owner & Lessee

Adams Brothers Company
Fidelity Building
Duluth 2, Minnesota

5.

	Years Production	
Maroco Mine	1921 to date	
Evergreen Mine	1925 to date	
Hillcrest Mine	1937 to date	under Adams Lease
Mangan No. 1 Mine	1938 to date	" " "
Joan No. 1 Mine	1949 to date	" " "
Louise Mine	1948 to date	" " "
Rabbit Lake Group	Est. Prod. 1954	
Virginia Mine	1948 to date	

6. Experience of operators:
See (2) above for experience of Robert M. Adams as an explorer.

7. History:
The history of Adams Brothers Company and Robert M. Adams, the President, is covered in (2) above, so it is assumed that question (7) refers to the project for which assistance is being requested, and the following statements refer to this project only.

(a) The Section 29 Manganese Area has been explored many times beginning in 1906, with the last explorations in 1950 by Adams Brothers Company. The orebodies on the Cuyuna Range are associated with lines of high magnetic intensity. One of these lines crosses the Section 29 Manganese Area. Data on the explorations accompany the applications for aid to explore in this area for manganese. The data at hand indicate that magnetic surveys and exploration by churn and diamond drilling have been the only mining activity in this immediate area.

(b) There has been no production from any adjoining property or property in the immediate vicinity, but the area is centrally located on the Cuyuna Range where the production of manganese as manganiferous ore is well known. The Section 29 Manganese Area is just north of the strike of the producing mines. A total of 69,897,814 tons of iron and manganiferous ore has been produced on the Cuyuna Range since 1911.

(c) All the available data accompany the applications mentioned in (a) above.

10. Production:
There has been no production from the Section 29 Manganese Area, and the Adams Brothers Company does not produce any thing measured in tons or pounds. See 1 (a) above.

Adams Brothers Company
Fidelity Building
Duluth 2, Minnesota

11. Do you contemplate a change in the present average monthly rate of production? If so, state estimated maximum monthly production and basis of change.
This question does not apply.

12. Ore or Mineral Reserves:
(a) There is a wide band of manganese bearing formation, with indicated width by drilling approximately 6,000 feet, of unknown length. The indicated length by drilling is at least 12,000 feet. There is no indication as to depth as the drilling is shallow, 80 feet to 300 feet, and the dip of the formation appears to be about 70% from the vertical. Data on the geology and explorations accompany this application.
(b) (1) The application is accompanied by maps showing the locations of the drill holes, and logs showing the available assays.
(2) A block 700 feet wide and 2600 feet long, in the Section 29 Manganese Area was estimated, from the drilling data, to contain 11,000,000 tons of material assaying 4.95 per cent manganese and 25.58 per cent iron. The material is classified as slate and schist from the drill cores and cuttings.

The average depth of the drill holes, included in the estimate was 115 feet in glacial drift and 76 feet in ledge. There is no evidence that any of the holes were drilled entirely through the formation.

The data at hand does not warrant an estimate of either measured or indicated ore, but the possibilities would appear to be large.

13. Access Roads:
The Northern Pacific and Soo Line railways have tracks within two miles of the center of the Section 29 Manganese Area.

A good automobile road is maintained by the township to residences on the property. This road connects with County and State hard surfaced roads.

There are ample urban and rural residence points within easy automobile travel distance from the property. The nearest village, Manganese is about 1½ miles from the center of the property. Crosby-Ironton, the largest towns on the Cuyuna Range are about 6 or 7 miles away.

14. Water Supply:
The Mississippi River bounds the area on the north east, Cole Lake is on the west, and Miller Lake is partly within the area on the south. The supply of water is ample for all purposes at all times of the year.

Adams Brothers Company
Fidelity Building
Duluth 2, Minnesota

15. Power:
A 110 KV transmission line of the Minnesota Power & Light Company, connecting the Cuyuna and Mesabi Ranges, crosses the area.

16. Labor:
There is an ample supply of trained labor for all types of mining operations on the Cuyuna Range. Uniform Wage scales prevail in all Minnesota mining districts.

17. Equipment and Facilities:
There are no buildings or equipment on the property. No buildings are projected for this project. All drilling will be done under contract by the Adex Corp., who will furnish all necessary equipment and labor.

Mr. Adams has the necessary personnel and equipment in Ironton to handle and store all samples, do engineering and surveying. Geological, mineralogical, and metallurgical studies will be made by and under the supervision of competent consulting engineers and geologists.

18. Mr. Adams has specialized for years in the discovery, exploration, and development of new and marginal mineral deposits, calling on his personal knowledge, and private collection geological data to initiate new projects, and employing specialists to carry on the detail work until a property is placed in the hands of an operating mining company for development and production, or the project is deferred or dropped because of adverse information or conditions. He is especially well qualified to carry this project to the production stage if the explorations prove the possibility of the economic production of manganese.

Adams Brothers Company
Fidelity Building
Duluth 2, Minnesota

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-2404
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) _____

26,270

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.

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 is the owner of the Southeast quarter of the Southwest quarter (SE¼ of SW¼), Section 20, Township 47, Range 29.

(c) The explorations contemplated would be upon the Southeast quarter of the Southwest quarter (SE¼ of SW¼), Section 20, Township 47, Range 29.

Enclosure to Application
Form MF-103

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

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 36.58 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 SE¼-S ½, Section 20-47-29, should include three (3) structure holes and seven (7) areal holes, which would require approximately seventeen hundred (1700) feet of drilling through surface and seven hundred and eighty (780) feet of drilling in ledge.

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

3. (a) It is estimated that the preliminary exploration program in the SE¼-SW¼, Section 20-47-29, should include three (3) structure holes and seven (7) areal holes, which would require approximately seventeen hundred (1700) feet of drilling through surface and seven hundred and eighty (780) 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.

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 MF-103

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

9. Drilling

1700 ft. surface drilling @ $5.00	$ 8,500	
780 ft. ledge drilling @ $10.50	8,190	
Carbon loss, estimated	920	
		$17,610

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

Geology	
At the rate of $600 a month	1,560
Engineering	
At the rate of $500 a month	1,800
Sampling	
At the rate of $200 a month (Including preparation and filing)	1,000
Assays	
Estimated	650
Metallurgy	
Estimated	2,000
Overhead	
Travel, office, misc.	2,100
	$26,720

Enclosure to Application
Form MF-103

ADAMS BROTHERS COMPANY

Duluth 2, Minnesota

10. (a) $6,680.00.

(b) Yes.

Enclosure to Application
Form MF-103

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?

How about Concentration methods? + use for sinter mix?

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

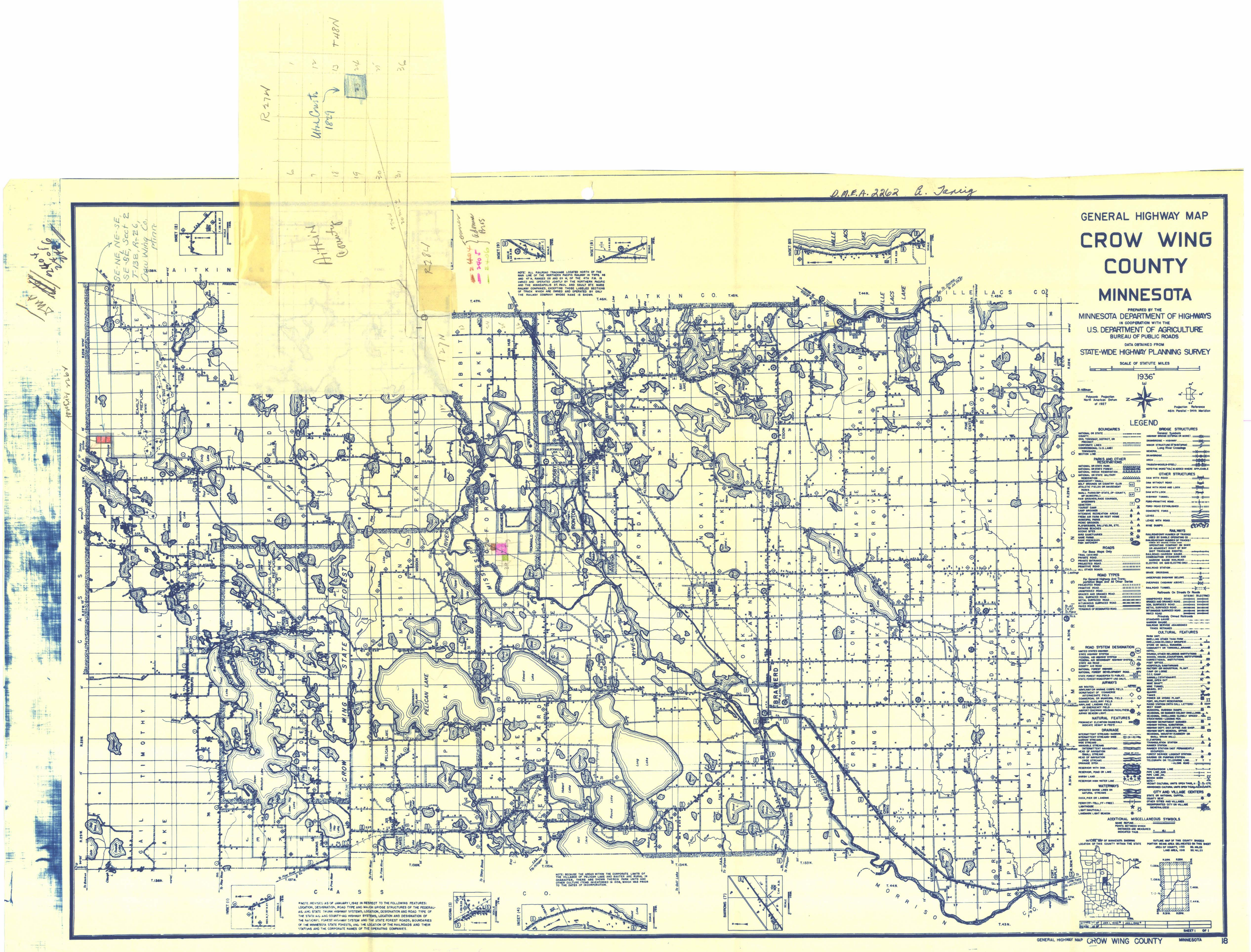
complete exploration of the whole area but that is not necessary at this stage. It should be enough to cover sufficient drilling for the uses noted and sufficient technical studies to demonstrate whether the area warrants further development.

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


D.M.E.A. 2262 A. Tarrig
GENERAL HIGHWAY MAP
CROW WING COUNTY
MINNESOTA
PREPARED BY THE
MINNESOTA DEPARTMENT OF HIGHWAYS
IN COOPERATION WITH THE
U.S. DEPARTMENT OF AGRICULTURE
BUREAU OF PUBLIC ROADS
DATA OBTAINED FROM
STATE-WIDE HIGHWAY PLANNING SURVEY
SCALE OF STATUTE MILES
1936*
Polyconic Projection North American Datum of 1927
Projection Reference 46th Parallel - 94th Meridian
LEGEND
NOTE: ALL RAILROAD TRACKAGE LOCATED NORTH OF THE MAIN LINE OF THE NORTHERN PACIFIC RAILWAY IN TWPS. 46 AND 47 N, RANGES 28 AND 29 W, OF THE 4TH P.M. IS OWNED AND OPERATED JOINTLY BY THE NORTHERN PACIFIC AND THE MINNEAPOLIS ST. PAUL AND SAULT STE MARIE RAILWAY COMPANIES, EXCEPTING THOSE LABELED SECTIONS OF TRACK WHICH ARE OWNED AND OPERATED BY ONLY THE RAILWAY COMPANY WHOSE NAME IS SHOWN.
NOTE: BECAUSE THE AREAS WITHIN THE CORPORATE LIMITS OF THE VILLAGES OF PELICAN LAKE AND BAXTER ARE RURAL IN CHARACTER, THERE ARE SHOWN THEREIN FARM UNITS AND OTHER CULTURE ITEMS INVENTORIED IN 1936, WHICH WAS PRIOR TO THE DATES OF INCORPORATION.
*NOTE: REVISED AS OF JANUARY 1, 1942 IN RESPECT TO THE FOLLOWING FEATURES: LOCATION, DESIGNATION, ROAD TYPE AND MAJOR BRIDGE STRUCTURES OF THE FEDERAL-AID AND STATE TRUNK HIGHWAY SYSTEMS; LOCATION, DESIGNATION AND ROAD TYPE OF THE STATE-AID AND COUNTY-AID HIGHWAY SYSTEMS; LOCATION AND DESIGNATION OF THE NATIONAL FOREST HIGHWAY SYSTEM AND THE STATE FOREST ROADS; BOUNDARIES OF THE MINNESOTA STATE FORESTS; AND THE LOCATION OF THE RAILROADS AND THEIR STATIONS AND THE CORPORATE NAMES OF THE OPERATING COMPANIES.
AITKIN CO.
MILLE LACS CO.
CASS CO.
MORRISON CO.
BRAINERD
CROSBY
IRONTON
DEERWOOD
PELICAN LAKE
SE-NE, NE-SE, SE-SE, Sect 2 T-138, R-26, Crow Wing Co. Minn
Aitkin County
Utah Crush 1829
R27W
T48N
REVISED AS OF JAN. 1, 1940 JAN. 1, 1942
SHEET 1 OF 1