DMA Form 1

IRON

DEFENSE MINERALS ADMINISTRATION
Control Slip

## CONTROLLED DOCUMENT

DMA Docket No. 1733 X

## 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

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

| | | | |
|---|---|---|---|
| To: | IRON & FERRO ALLOYS | Date | 11-17-51 |
| To: | F. L. Krause | Date | 11-26-51 |
| To: | Return to File | Date | 12-11-51 |
| To: | Mr. Delfino Rm. 3538 Iron & Ferro Alloys | Date | 1/4/52 |
| To: | Op Com | Date | 5-28-52 |
| To: | | Date | |
| To: | | Date | |
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## DO NOT DETACH

## CONTROLLED DOCUMENT

INT.-DUP. SEC., WASH., D.C. 98868

Docket
FILE COPY
SURNAME:

Martin
Selfridge

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

AUG 4 1952

Mr. Howard I. Young, Deputy Administrator
Defense Materials Procurement Agency
General Services Administration Building
Washington 25, D. C.

Re: Docket No. DMA 1733X - Iron
Whitechuck, Incorporated
Snohomish County, Washington

Dear Mr. Young:

Enclosed are spare copies of correspondence between DMEA (or its predecessor DMA) and Whitechuck, Incorporated, 224 West 195th Street, Seattle 77, Washington.

As you will note from the above attachments, Whitechuck applied under date of June 13, 1951, for aid for an exploration project covering iron occurring as magnetite in Snohomish County, Washington. Although the same application omitted even such essential information as the amount of aid requested, it was not until April 14, 1952, that we received a reply (dated February 19, 1952) to our letters of July 3, August 22 and December 14, 1951, requesting further details from the applicant.

Both Martha S. Carr, U. S. Geological Survey, and Jashin M. Forbes, U. S. Bureau of Mines, to whom the docket was referred respectively on April 15 and April 23, 1952, noted that Whitechuck's proposal was a production rather than an exploration project and suggested that the field team be consulted. Accordingly, under date of May 29, 1952, the docket was sent to the Executive Officer, Region II, with the suggestion that the applicant be contacted to determine what exploration assistance was desired.

On July 28, 1952, advice was received from the field team that Mr. R. C. Robinson, Chairman of the Board, of Whitechuck had stated that he was not interested in exploration assistance but only in a production loan.

We are, therefore, referring the foregoing docket to you for consideration.

Sincerely yours,

8/4

C. O. Mittendorf

Acting Administrator
Defense Minerals Exploration
Administration

Enclosures

WSMartin'lm
8/1/52

cc: Admn. Reading File
Docket
F. M. Forbes, USBM
Martha Carr, USGS
Field Team Reg. II
G. C. Selfridge
W. S. Martin

FILE COPY
SURNAME:

Martin
Selfridge

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

AUG 4 1952

Mr. R. C. Robinson
Whitechuck, Inc.
224 West 195th Street
Seattle 77, Washington

Re: Docket No. DMA 1733X - Iron
Whitechuck, Inc.
Sunk 1 to 7, inclusive
Snohomish County, Washington

Dear Mr. Robinson:

Reference is made to your conversations early this month regarding the subject project with the members of the Defense Minerals Exploration Administration Field Team for Region II with headquarters at Spokane, Washington.

We understand that you are not interested in exploration assistance but only in a production loan. Accordingly, we have referred your application, and copies of our subsequent correspondence, to the Defense Materials Procurement Agency for consideration.

Sincerely yours,

C. O. Mittendorf (for) 8/4/52

Acting Administrator
Defense Minerals Exploration
Administration

WSMartin'lm
8/1/52

cc: Admn. Reading File
Docket
J. M. Forbes, USBM
Martha Carr, USGS
Field Team Reg. II
G. C. Selfridge
W. S. Martin

STANDARD FORM NO. 64



# Office Memorandum • UNITED STATES GOVERNMENT

TO : R. E. Adams, Administrative Officer, DMEA
Attn.: Docket and Control Branch

DATE: August 1, 1952

FROM : Iron and Ferro-Alloy Division, DMEA

SUBJECT: Docket No. DMA 1733X - Iron
Whitechuck River Deposits
Snohomish County, Washington

The above docket is returned herewith. Also attached is a copy of a letter to Defense Materials Procurement Agency from the Acting Administrator, Defense Minerals Exploration Administration, transmitting duplicate copies of the correspondence in the same docket and explaining that since the applicant is interested in a production loan rather than exploration assistance the matter is one for consideration by Defense Materials Procurement Agency.

G. C. Selfridge.

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

Attachment

FILE COPY
SURNAME:

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

M. H. Adams, Administrative Officer, DMEA
Attn.: Docket and Control Branch

August 1, 1952

Martin
Selfridge

Iron and Ferro-Alloy Division, DMEA

Docket No. DMA 1733X - Iron
Whitechuck River Deposits
Snohomish County, Washington

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George C. Selfridge

cc 8/4/52

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

Attachment

WSMartin'lm
8/1/52

cc: Admn. Reading File
Docket
G. C. Selfridge
W. S. Martin

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION
WASHINGTON 25, D. C.
So. 157 Howard Street
Spokane 4, Washington

Dma 1733

July 26, 1952

Mr. R. S. Robinson
Whitechuck, Incorporated
224 West 175th Street
Seattle 77, Washington

Dear Mr. Robinson:

Mr. [illegible] A. Hagill of the U. S. Bureau of Mines contacted you with reference to your Whitechuck River deposits. He states that you are not interested in exploration assistance, but only in a production loan. I am enclosing herewith the necessary forms to apply for a production loan on the property.

Sincerely yours,

A. [illegible] Weissenborn
Executive Officer, DMA
Field Team, Region II

Enclosures

cc: USBM
OMSA

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

So. 157 Howard Street
Spokane 4, Washington

8/5/52

July 26, 1952

AUG 4 1952

Memorandum

To: Operating Committee, DMEA

From: DMEA Field Team, Region II

Subject: Docket No. DMEA-1733X, Iron, Whitechuck River Deposits, Snohomish County, Washington

In reply to your referral on the subject docket, the applicant, Mr. R. C. Robinson, was interviewed by E. A. Magill of the Bureau of Mines. A brief memorandum by Mr. Magill is attached which states that the applicant is not interested in exploration assistance. Application blanks for a production loan are being sent to him.

Letter referred to DMEA

By DMEA Field Team, Region II

A. E. Weissenborn

A. E. Weissenborn, Exec. Officer
(U. S. Geological Survey)

M. E. Volin

M. E. Volin, Member
(U. S. Bureau of Mines)

Enclosure

cc: USBM

Copy retained 400

So. 157 Howard Street
Spokane 4, Washington

July 26, 1952

Memorandum

To: Operating Committee, DMEA

From: DMEA Field Team, Region II

Subject: Docket No. DMEA-1733X, Iron, Whitechuck River Deposits, Snohomish County, Washington

In reply to your referral on the subject docket, the applicant, Mr. R. C. Robinson, was interviewed by E. A. Magill of the Bureau of Mines. A brief memorandum by Mr. Magill is attached which states that the applicant is not interested in exploration assistance. Application blanks for a production loan are being sent to him.

By DMEA Field Team, Region II

A. E. Weissenborn, Exec. Officer
(U. S. Geological Survey)

M. E. Volin, Member
(U. S. Bureau of Mines)

Enclosure

cc: USBM

AEW/iml

C
O
P
Y

M. E. Volin, Member DMEA Field Team, Region II July 22, 1952

E. A. Magill, Mining Engineer, Bureau of Mines

Docket No. DMEA 1733X (Iron)
Whitechuck River Deposits, Snohomish County, Washington

The applicant, Mr. R. C. Robinson, was contacted on July 7, 1952, in regard to the intent of his application on the subject property. He stated that he was not interested in exploration assistance but only in a production loan.

Although the property was not visited, it is reported by members of the Washington State Division of Mines and Geology that the deposit does not contain any greater percentage of magnetite than other sand and gravel deposits. When questioned on this subject, the applicant stated that he had no reason to believe that it did.

It is suggested that the docket be referred to the Defense Materials Procurement Agency for appropriate action.

E. A. Magill

Orig. to files
cc: Wash. (2)
USGS (1)
Albany(1)
EAM (1)

M. E. Volin, Member DMEA Field Team, Region II July 22, 1952

E. A. Magill, Mining Engineer, Bureau of Mines

Docket No. DMEA 1733X (Iron)
Whiteohuck River Deposits, Snohomish County, Washington

The applicant, Mr. R. C. Robinson, was contacted on July 7, 1952, in regard to the intent of his application on the subject property. He stated that he was not interested in exploration assistance but only in a production loan.

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It is suggested that the docket be referred to the Defense Materials Procurement Agency for appropriate action.

Orig. to files
cc: Wash. (2)
USGS (1)
Albany (1)
EAM (1)

E. A. Magill

M. E. Volin, Member DMEA Field Team, Region II July 22, 1952

E. A. Magill, Mining Engineer, Bureau of Mines

Docket No. DMEA 1733X (Iron)
Whitechuck River Deposits, Snohomish County, Washington

The applicant, Mr. R. C. Robinson, was contacted on July 7, 1952, in regard to the intent of his application on the subject property. He stated that he was not interested in exploration assistance but only in a production loan.

Although the property was not visited, it is reported by members of the Washington State Division of Mines and Geology that the deposit does not contain any greater percentage of magnetite than other sand and gravel deposits. When questioned on this subject, the applicant stated that he had no reason to believe that it did.

It is suggested that the docket be referred to the Defense Materials Procurement Agency for appropriate action.

E. A. Magill

400

FILE COPY
SURNAME:

Chapman
Selfridge

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

Mr. A. H. Weissenborn
Executive Officer, Region II
South 157 Howard Street
Spokane 8, Washington

MAY 29 1952

Re: Docket No. DMA 1733X - Iron
Whiteshuck River Deposits
Snohomish County, Washington

Dear Mr. Weissenborn:

We are sending you a docket on the above stated project, in which an application has been made for exploration assistance.

This applicant makes no specific proposal for exploring the property. In fact, all the data submitted indicate that a production loan is desired rather than an exploration loan.

We suggest that you contact the applicant and find out if he desires exploration assistance and, if so, the amount and type of work he wishes.

If the applicant desires a production loan, refer him to the Defense Materials Procurement Agency and suggest that he withdraw his application for exploration assistance.

Sincerely yours,

cc

(signed) FRANK E. JOHNSON (HB) 5/29

Chairman, Operating Committee
Defense Minerals Exploration
Administration

Enclosures

TLChapman:lm
5/26/52

Approved:

Ira H. Hedges (HB)
Member, Bureau of Mines

D. M. Lemmon (HB)
Member, Geological Survey

cc: Admn. Reading File
Docket
J. M. Forbes, USBM
Martha Carr, USGS
Field Team Reg. II
Operating Committee
G. C. Selfridge
T. L. Chapman

FILE COPY
SURNAME:

Chapman
Selfridge
Rodgers

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

MAY 29 1952

Mr. R. G. Robinson
Whiteshuck, Incorporated
224 West 195th Street
Seattle 77, Washington

Re: Docket No. DMA 1733X - Iron
Whiteshuck River Deposits
Snohomish County, Washington

Dear Mr. Robinson:

Your application for assistance in exploring the above noted property has been reviewed by the Iron and Ferro-Alloy Division of the Defense Minerals Exploration Administration. We cannot find where you have made any specific proposal for an exploration project. Hence, we are referring it to Mr. A. E. Weissenborn, Executive Officer, Region II, South 157 Howard Street, Spokane 8, Washington.

The Regional Office will contact you at an early date in regard to your desires on the project.

Sincerely yours,

cc
5/29

C. D. Mittendorf (for)
Acting Administrator
Defense Minerals Exploration
Administration

TLChapman:lm
5/26/52

cc: Admn. Reading File
Docket
J. M. Forbes, USBM
Martha Carr, USGS
Field Team Reg. II
Operating Committee
G. C. Selfridge
T. L. Chapman

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

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
MAY 19 1952

May 16, 1952

Memorandum

To: George Selfridge - D. M. E. A.

From: Jachin M. Forbes, United States Bureau of Mines

Subject: Review of Docket No. D.M.E.A. 1733-X (Iron Ore) Whitechuck Inc., Snohomish Co., Washington.

I have reviewed the information connected with the subject proposal which was forwarded to me under Miss Carrs' memorandum to you of April 23.

As noted by Miss Carr, the proposal requests no assistance for exploration, and the question of claimant agency is not clear. Aside from that aspect of the proposal, the following comments are offered:

Mr. Robinson and his associates have done what must appear to them extensive investigation into the possibilities of exploiting an easily mined mineral deposit. The idea of developing complex mineral deposits, and especially iron production in that area is one that I would like to encourage. However, the information assembled thus far in this instance is inadequate and unreliable as a basis for the expenditure of the required funds. It is possible that the scheme would work out, but it is not possible to judge the degree of risk involved without a detailed study under professional guidance with respect to both economics and technology.

In order to justify activation of the proposal, preliminary investigations should be made to determine the average analysis of magnetic concentrates. The documents submitted with the proposal indicate that the average iron content would be less than 50 percent with over 25 percent silica plus alumina plus titania (acid gangue to be slagged). The 72 percent mentioned by Mr. Robinson must refer to iron oxide content and would indicate a low grade ore after concentration.

Additional studies would be indicated only if a higher grade concentrate is assured. These would include experimental runs in a commercial size electric furnace to determine the cost data and chemical analysis of the pig iron produced.

Copy retained 400

It seems fair to assume that acceptable iron could be marketed, but the evidence indicates that the pigs produced at the University of Washington were high in silica (light color and high smelting temperatures). High silica or silvery iron has a limited but premium market.

If it is decided that D.M.E.A. is to continue an interest in this proposal, I recommend that the field team be consulted on the over-all aspects of the proposal. It may be that the Bureau of Mines' Northwest Electrodevelopment Laboratory at Albany, Oregon would be interested in the possibilities. I am forwarding the docket as received from Miss Carr.

Jachin M. Forbes

Enclosure

IN REPLY REFER TO:

G-MD-MC

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

April 23, 1952

Memorandum

To: George E. Selfridge, DMEA

From: Martha S. Carr, USGS

Subject: Review of Docket No. DMA 1733X
Whitechuck, Inc.
Snohomish County, Washington

In answer to your memorandum of April 15:

The aid required by the applicant appears to be of a DMPA rather than a DMEA nature. His answer to Question 21 under the Exploration includes the building of a separation plant, an electric furnace plant, and a charcoal plant--and refers to no exploration of the property to prove his estimates of reserves (5,940,000 tons of magnetite iron).

As the only information available to us concerning the deposit of magnetic black sand is that furnished by the applicant, it is recommended that the application be referred to the field team for verification of the data and an understanding with the applicant as to whether or not exploration aid is required. This suggestion is dependent, of course, upon an affirmative decision by Mr. Forbes of the Bureau of Mines that the titaniferous sand is amenable to present metallurgical methods--and that the project appears to be feasible from a commercial standpoint.

The attachments pertaining to this docket, together with a copy of this memorandum, are being forwarded to Mr. J. M. Forbes.

Martha Carr

Copy retained 400

IN REPLY REFER TO:

G-[illegible]

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

April 23, 1952

Memorandum

To: George E. Mefridge, DMEA

From: Martha S. Carr, USGS

Subject: Review of Docket No. DMA 1733X
Whitechuck, Inc.
Snohomish County, Washington

In answer to your memorandum of April 15:

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The attachments pertaining to this docket, together with a copy of this memorandum, are being forwarded to Mr. J. M. Forbes.

Attachments:

Copies to: J. M. Forbes
Director's reading (4212)
Branch
DMEA File
Ferrous Metals File

MCarr:mw
G: 4/23/52

FILE COPY
SURNAME:

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

Mrs. Martha Carr, U. S. Geological Survey April 15, 1952

Iron and Ferro-Alloy Division, Defense Minerals Exploration Administration

Review of Docket No. DMA 1733X
Whitechuck, Inc.
Snohomish County, Washington

Attached is the application received from the above-referenced applicant on June 25, 1951, together with a letter of February 19, 1952, which gives further data to supplement the original loan application. The applicant has furnished us a single set of three maps and two pages of photographs, which are also attached.

It is requested that you review the application and other material and furnish us with your comments to supplement those given in your memorandum of February 7, 1952, which were based upon review of the original application only.

Following your review of the attachments, it is requested that you forward them, together with a copy of your memorandum, to Mr. J. M. Forbes, Bureau of Mines, Room 3517, Interior Building, in order that he too may let us have his opinion on this application.

George C. Selfridge

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

Attachments

LScott

cc: Docket
Admn. Reading File
G. C. Selfridge
J. M. Forbes, USBM

BARD FORM NO. 64

# Office Memorandum • UNITED STATES GOVERNMENT

TO : Mr. Robert E. Adams DATE: March 26, 1952
Attention: Code 230 - Docket and Control Section

FROM : Iron and Ferro-Alloy Division, DMEA

SUBJECT: Removal from active file of: Docket No. DMA 1733X
Whitechuck, Inc.
Snohomish County, Washington

We are removing the subject application from our active file because the applicant was advised by letter dated December 14, 1951, that it was being placed in the inactive file until we had further information from him.

G. C. Selfridge

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

Attachment

FILE COPY
SURNAME:

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

March 26, 1952

Selfridge

Mr. Robert E. Adams
Attention: Code 230 - Docket and Control Section
Iron and Ferro-Alloy Division, DMA

Removal from active file of: Docket No. DMA 1733X
Whitechuck, Inc.
Snohomis County, Washington

We are removing the subject application from our active file because the applicant was advised by letter dated December 14, 1951, that it was being placed in the inactive file until we had further information from him.

George C. Selfridge
3/26

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

Attachment

GCSelfridge:ls

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

1737 - 7/13 PB

M 7 103 is not complete - There is no data filed beyond item 16 —

There is no proposal of work to be done

Letters of Aug 3, Aug 22 + Dec 14 all request information - no direct answers giving data)

We should write a letter requesting information or withdrawal

Frank Johnson Dec 14 - says it is in the inactive file -

What now?

3/25/52

Mr. Selfridge:

Can this docket be sent to Mr. Adams? We have kept it here pending advice from the applicant, but on basis of Mr. Johnson's letter of 12/14/51 to Mr. Robinson that the application was being placed in the inactive file "until we have further information from you", perhaps we can "remove" the docket without a further letter to Robinson?????

ls

yes 3/25/52

(Formerly) WHITECHUCK INC.
UNIT COMPANY INC.
224 WEST 195TH ST.
SEATTLE 77, WASHINGTON

DEVELOPMENT
CONSTRUCTION

OPERATION
MANAGEMENT

FEB 19 1952

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
APR 14 1952

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

Re: Docket No. DMEA 1733X
Whitechuck, Incorporated
Exploration Project Application

Gentlemen:

We refer to your letters dated December 14, 1951, August 22, 1951, and July 3, 1951.

In your letter of July 3rd you requested that questions 17 to 23 inclusive, of Form MF-103, be answered, with answers to several other points to be covered also. It was necessary for us to carry out a great deal of work to properly answer the points brought up in your correspondence.

We were surprised that more work had not been accomplished on the benefication of the low grade Minnesota ores, as the writer while remodeling a cement plant in 1920 in St. Louis obtained information on the work then being carried out. At that time D. C. Jackling of Salt Lake City employed the Hardinge Company to carry out the mill tests on separating this low grade ore. It was found that this separation could be done but, as Mr. Jackling stated, they were twenty years too early.

In addition to answering the questions raised in your letter of July 3rd, we are enclosing copies of the following letters: our letter to Mr. E. W. Davis dated August 23, 1951, note the first paragraph on how we obtained the magnetite ore; copy of Mr. E. W. Davis letter dated October 29, 1951, to which was attached a report from H. S. Taylor to H. H. Wade dated October 1, 1951, you will

Defense Minerals Administration

Whitechuck Inc.
224 West 195
Seattle 77

note in this report the silica content was high (poor separation of sample on our part) and that the $TiO_2$ percentage of the feed was 9.84, all previous tests show a percentage of $TiO_2$ ranging from 9% to 10%; a letter from Reserve Mining Co. dated August 15, 1951; and a letter from Nichols Engineering and Research Corp. dated August 6, 1951. We further had a test made of our material run through a Ding Separator at Milwaukee, Wisconsin by T. Make of the Dings Magnetic Separator Co., copy of the test is attached.

Following are theanswers to questions 17 through 23, as per your letter dated July 3, 1951.

17. Mine is not in production.
Proven metallurgical process of extraction of iron and pumice;
Pumice to be screened out,
Magnetic iron removed with Ding Magnetic Separators.
Cost of plant complete - $52,700.00

| | |
|---|---|
| Prepare site & building - - - - - - | 7,200.00 |
| Feeder, washer, generator, etc. - - | 28,500.00 |
| Magnetic separators - - - - - - - - | 17,000.00 |
| | $52,700.00 |

Cost of operating plant 24 hours per day

| | |
|---|---|
| Power - - - - - - - - - - - - - | 24.00 |
| Gas, oil, repairs, misc. - - | 180.00 |
| Labor, 10 men @$18.00 - - - | 180.00 |
| Overhead - - - - - - - - - - | 120.00 |
| Royalty - - - - - - - - - - - | 60.00 |
| Depreciation & interest - - | 75.00 |
| | $639.00 |

Production per 24 hours
Magnetite Iron Ore - 259.2 tons
(90% to 98% pure ore)
Cost of Iron Ore per ton extracted
$639.00 divided by 259.2 or $2.46 per ton

18. (a) Magnetite Iron Ore was a water bourn deposit in a former lake. Interspersed with layers of magnetic iron and sand, are strata of pumice and sand.

(b) See attached maps and assay data.

(c) Based upon the exposures now existing and holes excavated, there are five hundred acres with an average depth of fifty feet, resulting in an estimated 5,940,000 tons of magnetite iron.

Defense Minerals Administration

Whitechuck Inc.
224 West 195
Seattle 77

19. The magnetite or "blacksand" in this area is a concentration deposit in pumice, scoria, and a silica feldspar sand deposited in an old glacial lakebed by the Whitechuck River. The pumice and scoria originating from Glacier Peak volcanic action and the sands from disintegration of various igneous rocks cut by the Whitechuck River.

The magnetite occurs with the silica and feldspar sand and generally is consistent throughout the deposit from top to bottom. There are many exposures on the sides of the deposit showing the full depth. These faces have been thoroughly sampled along with some two hundred test holes.

Mineralogically the magnetite is relatively pure, phosphorus percentage being 0.02%, sulphur negligible 0.003%, and titanium 5.10%. Iron content 72% plus.

In addition to the various assays and tests attached, a reduction test of the magnetite was made at the University of Washington. A small pig was produced using an oil heat furnace and another pig was produced in a PCE furnace, using propane gas. The iron was high grade. The reduction of magnetite ($Fe_3O_4$) iron ore requires more heat, but if the ore contains small amounts of the elements sulphur and phosphorus it reduces to a high grade iron. With these elements being present as stated above the reduced iron was a hard, dense, light-colored iron of extra fine quality. In reducing the iron no coke was used, only charcoal. Charcoal was used to obtain an iron product equal to the famous Swedish iron. This iron can then be developed into the highest grade carbon steel, high speed tool steel, stainless steel, or special alloy steel.

The cost of pellatizing or sintering being so great, note previous costs submitted, it is felt that immediately treating the magnetite iron ore in an electric furnace and producing pig iron would be more economical. We are advised by personnel at the College of Mines, University of Washington, that the titanium would go off in the slag. We are further advised that high grade pig iron would have a ready market, both from steel mills and foundries, in the immediate trade area.

Cost of Lectromelt Furnace, installed complete:

| | |
|---|---|
| "OPT" furnace, electric sub-station, and control equipment . . . . . | $150,000.00 |
| 3 - 10 ton bottom pour ladles comp. . . . . | 10,000.00 |
| Freight on furnace, etc. . . . . | 6,000.00 |
| 50 - 12" electrodes . . . . . | 4,500.00 |
| Building, 60 feet by 120 ft. . . . . | 90,500.00 |
| 2 - 15 ton traveling cranes . . . . . | 40,000.00 |
| Runways, foundation, etc. . . . . | 35,000.00 |
| Molds . . . . . | 25,000.00 |
| Laboratory, office, bins, etc. . . . . | 35,000.00 |
| Total . . . . . | $396,000.00 |

19. (Continued)

With the pig iron plant located at Darrington, Snohomish County, Washington; charcoal can be produced from waste material now left in logging usable timber.

In the reduction of magnetite iron ore, experience has shown that charcoal is superior to coal coke in the production of high grade iron.

In the manufacture of charcoal, the costs in this report are based on the process described in the April 1949, Vol. 1 No. 2, issue of The Trend in Engineering published at the University of Washington. This article was written by Bror L. Grondal, Professor of Forest Products and Piotr Zencsak, Research Fellow in the Engineering Experiment Station.

In the production of charcoal in large quantities, commercially important by-products are obtained. To obtain the required amount of charcoal, there will be extracted sixty tons of distillate. The further processing of this distillate is a subject that is of such scope and magnitude that it should be taken up as a separate report.

A steady market for mill waste and timber not suitable for timber products will be made available by this development. Much of the timber now wasted or left standing, due to it's non-commercial suitability, will assume a good commercial value. This timber which is now a fire hazard and a tremendous waste of our natural resources will, when utilized, mean - more jobs, value in place of waste, a supply of charcoal, and a supply of valuable by-products.

Eighty tons of charcoal will be required each day. This will necessitate the charring of 175 cords of fir, hemlock, or alder per day.

Yield in charcoal is 40% plus by weight.

Yield in distillate is 30% by weight of which 10% to 12% are phenols. This distillate would be stored in pools, for future use in markets would develop once it was known that sizeable quantities were available.

Improved charcoal from wood with a greater yield of condensable distillates would be produced in the pyrolysis of wood in a process which includes immersion of the wood in kerosene, with a steel retort as a container. This retort is equipped with a condenser and receiver. The kerosene is recaptured and re-used with slight loss. Only 8 hours, instead of the 36 hours under ordinary conditions of dry distillation, are required to complete this process.

Plant, equipment, and productions costs using forest waste:

Electricity is to be used for power.
The raw wood is required to be reduced to cubes of 4" or smaller, to chips, or sawdust.

Defense Minerals Administration

Whitechuck Inc.
224 West 195
Seattle 77

19. (Continued)

| | |
|---|---|
| Cost of wood producing plant and equipment, including 4 hogs with individual 125 HP motors . . . . . | $125,000.00 |
| Cost of charring plant, 3 retorts with necessary equipment . . . . . | 360,000.00 |
| | $485,000.00 |

| | |
|---|---|
| Cost of producing wood and delivering to plant . . . . | $5.50 per cord |
| Cost of grinding wood . . . | 0.50 per cord |

At 40% yield:

| | |
|---|---|
| Cost of raw material per ton of charcoal . . | $13.00 |
| Cost of charring, per ton of charcoal . . . | 8.00 |
| Cost to produce improved charcoal per ton . | $21.00 |

We are further advised that the distillate would sell for further processing at over $200.00 per ton or over $12,000.00 per day.

20. Magnetite iron ore, a water deposition in the form of sand.

21.

| | Cost | Time |
|---|---|---|
| Separation Plant | $52,700.00 | Six Months |
| Electric Furnace Plant | 396,000.00 | Twelve Months |
| Charcoal Plant | 485,000.00 | Twelve Months |

This will give a minimum yearly production of 52,800 tons of very high grade pig iron.

22. See Items 18 and 19.

23. Mining & Milling for six months:

| | |
|---|---|
| (a) Labor | |
| 10 Laborers @$18.00 per day . . . . . | $21,600.00 |
| (b) Supervisors | |
| 3 Superintendents @$25.00 per day . . . . | 9,000.00 |
| 2 Office Workers @$15.00 per day . . . . | 3,600.00 |
| 2 Engineers @$30.00 per day . . . . . | 7,200.00 |
| 1 Manager @$20.00 per day . . . . . | 2,400.00 |
| (c) None | |
| (d) Site preparation & building . . . . . | 7,200.00 |
| Sub-Total . . . | $51,000.00 |

Defense Minerals Administration

Whitechuck Inc.
224 West 195
Seattle 77

23. (Continued)

Mining & Milling for six months:

| | | |
|---|---|---|
| | Balance brought forward | $ 51,000.00 |
| (e) | Feeder, washer, generator, etc. | 28,500.00 |
| | Magnetic separators | 17,000.00 |
| (f) | None | |
| (g) | None | |
| (h) | Miscellaneous materials & supplies | 500.00 |
| (i) | Power, water, etc. @$24.00 per day | 2,880.00 |
| | Total | $ 99,880.00 |

Smelting for twelve months:

| | | |
|---|---|---|
| (a) | Labor | |
| | 3 Melters @$30.00 | $ 21,600.00 |
| | 12 Helpers @$20.00 | 57,600.00 |
| | 1 Metallurgist @$30.00 | 7,200.00 |
| (b) | Supervisors | |
| | 1 Superintendent @$25.00 | 6,000.00 |
| | 2 Officer Workers @$15.00 | 7,200.00 |
| | 1 Chemical Engineer @$30.00 | 7,200.00 |
| (c) | None | |
| (d) | Site preparation & building | 160,500.00 |
| (e) | "OPT" furnace, electric sub-station and control equipment | 150,000.00 |
| | 3 - 10 ton bottom pour ladles | 10,000.00 |
| | 50 - 12" electrodes | 4,500.00 |
| | 2 - 15 ton traveling cranes | 40,000.00 |
| | Molds | 25,000.00 |
| | Freight on equipment | 6,000.00 |
| (f) | None | |
| (g) | None | |
| (h) | Miscellaneous materials & supplies | 5,000.00 |
| (i) | Power, water, etc. @$1,050.00 per day | 12,600.00 |
| | Total | $ 520,800.00 |

Charcoal Production for twelve months:

| | | |
|---|---|---|
| (a) | Labor | |
| | 2 Chargers @$30.00 | 14,400.00 |
| | 20 Wood Workers @$25.00 | 120,000.00 |
| | 10 Plant Operators @$18.00 | 43,200.00 |
| (b) | Supervisors | |
| | 2 Chemical Engineers @$30.00 | 14,400.00 |
| | 1 Superintendent @ $30.00 | 7,200.00 |
| | 2 Office Workers @ $15.00 | 7,200.00 |
| | Sub-Total | 206,400.00 |

Defense Minerals Administration

Whitehchuck Inc.
224 West 195
Seattle 77

23. (Continued)

Charcoal Production for twelve months:

| | |
|---|---|
| Balance brought forward . . . . . | $206,400.00 |
| (c) None | |
| (d)&(e) | |
| Wood producing plant and equipment . . | 125,000.00 |
| Charring plant and equipment . . . . . | 360,000.00 |
| (f) None | |
| (g) None | |
| (h) Miscellaneous materials & supplies . . | 6,000.00 |
| (i) Power, water, etc. @ $90.00 per day . . | 1,080.00 |
| | $698,480.00 |

24. Note Item 21, cost of each operation is shown separately and the time needed to put each operation in production. The time required for each operation is based on the ability to obtain delivery of the equipment needed.

Again referring to your letter dated July 3, 1951, we believe all questions have been answered in the preceding items. Any data or costs not covered will be sent you at once.

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.

Whitehuck Inc. — R. A. Robinson

Feb. 19, 1952 (Date) — Chairman of the Board (Title)

C O P Y

C O P Y

August 31, 1951

Mr. E. W. Davis
University of Minnesota
Institute of Technology
Mines Experiment Station
Minneapolis 14, Minnesota

Dear Mr. Davis:

We refer to your letter of August 14, 1951.

We are sending you under separate cover about 21 pounds of the magnetic iron ore referred to in our letter of August 7th. This ore was obtained by running the sand through a Humphrey Spiral Concentrator (manufactured by the Humphreys Investment Co., Denver, Colorado). The ore was extracted in the above machine at the University of Washington. There was available a magnetic iron ore separator at the University which was used in cleaning the product from the Spiral Concentrator. This magnetic separator was not very efficient, so you will find the sample we are sending you will contain more silica and detritus than if the material had been run through a modern magnetic separator.

Your advice as to whether or not this material can be pellatized and put into the proper condition for blast furnace smelting will be greatly appreciated.

Thank you for your kindness in performing this research.

Very truly yours,

UNIT COMPANY INC.

/s/ R. C. Robinson

R. C. Robinson

RCR:e

UNIVERSITY OF MINNESOTA

Institute of Technology

Minneapolis 14

c o p y

Mines Experiment Station

October 29, 1951

Mr. R. C. Robinson
Unit Company Inc.
224 West 195th Street
Seattle 77, Washington

Dear Mr. Robinson:

I am attaching a copy of the report on the sample of magnetite sand that you submitted in August. This material did not contain enough fine material for satisfactory balling and, therefore, it was ground finer.

It was found that after grinding to 40% minus 325 mesh, satisfactory balls and pellets could be produced, although still finer grinding--50% minus 325 mesh--is recommended. Good, strong pellets can be made from this material but they are not of high quality, chemically, since they contain 17.86% $SiO_2$ and 9.38% $TiO_2$. A small sample of the pellets is being sent to you under separate cover.

A magnetic separation test was made after grinding a sample of this concentrate to minus 100 mesh. This is a standard magnetic tube test. The results show that the $TiO_2$ is very closely associated with the magnetite and concentrates with the iron. Grinding and magnetic concentration will reduce the silica materially but will not reduce the $TiO_2$.

If you are interested in the agglomeration of this material commercially, we may be able to assist you a little later.

Very truly yours,

/s/ E. W. Davis

E. W. Davis

EWD:MM

c o p y

C O P Y

October 1, 1951

C O P Y

To: Mr. H. H. Wade

From: L. S. Taylor

Subject: Unit Company Inc. Magnetite Concentrate Pellatizing Tests

## Sample

This concentrate had been made on a Humphrey Spiral Concentrator and, consequently, carried little slime. However, this sample contained much gangue, analyzing only 42.91% total iron, 18.95% $Fe^{++}$ and 0.03% S.

## Screen Sizings

| Size | As received % Wt. | Final Test Grind % Wt. |
|---|---|---|
| Plus 48 Mesh | 12.60 | 0 |
| " 65 " | 23.00 | 0.30 |
| "100 " | 30.61 | 2.70 |
| " 150 " | 20.87 | 15.30 |
| " 200 " | 6.05 | 18.10 |
| " 325 " | 4.84 | 24.00 |
| Minus 325 " | 2.03 | 39.60 |

## Pelletizing Tests

Balling drum tests were first made on the original sample and after grinding to 29% minus 325 mesh but even after this grind the agglomeration was weak and the pellets were unsatisfactory.

After grinding further to minus 39.60% minus 325 mesh pellets were rolled in the normal manner at 8.75% moisture and gave no trouble, but the green strengths were a little under standard for furnace feed. The wet strength for plus 1/2" minus 3/4" pellets averaged 1.78 pounds and the dry strength averaged 1.48 pounds for this grind. This concentrate would, therefore, require a little finer grinding to bring the pellet quality to standard, unless some binder is used to produce a highter dry strength. Grinding to 50% minus 325 mesh should raise the green strength sufficiently, without an additive.

## Burned Pellets

Pellets made from the test grind (39.6% minus 325 mesh) were heated in a gas fired furnace to 1100° C. This temperature was high enough to burn them to a very satisfactory product. Tested under compression the strength of the burned pellets averaged 460 pounds.

### Analysis

43.66% Fe
15.20% $Fe^{++}$
17.86% $SiO_2$
4.23% $Al_2O_3$
9.38% $TiO_2$
2.14% CaO
5.46% MgO

### Magnetic Tube Test

| | % Wt. | %Fe | %$TiO_2$ | Fe Units | % Mag. Fe | %Fe Rec. | %$TiO_2$ Rec. |
|---|---|---|---|---|---|---|---|
| Feed | 100.00 | 43.50 | 9.84 | 43.50 | 42.295 | | |
| Concentrate | 74.90 | 56.43 | 12.72 | 42.295 | | 97.37 | 95.83 |
| Tailing | 25.10 | 4.80 | 1.63 | 1.205 | | | |

LST:MM

COPY

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RESERVE MINING COMPANY
EXECUTIVE OFFICES
GUILDHALL BUILDING
CLEVELAND 15, OHIO

C O P Y

August 15, 1951

Mr. R. C. Robinson
Unit Company Inc.
224 West 195th Street
Seattle 77, Washington

Dear Sir:

This letter is in answer to yours of August 7, 1951.

From the screen analysis given in your letter, it appears that the concentrate made from your ore is on the fine side for sintering, but I could be wrong on this point. There are other characteristics besides the fineness of the ore which determine its suitability for agglomerating by the sintering process.

If you want to investigate the possibility of sintering your ore, I would suggest you get in touch with Arthur G. McKee and Company, 2300 Chester Avenue, Cleveland, Ohio. The McKee Company are outstanding in engineering work on sintering, particularly Mr. Morgan of that company. Based on some figures which are now a little bit old and therefore may not be too accurate, a sintering plant with 1000 ton per day capacity should cost in the neighborhood of $2,000,000 to $2,500,000.

For pelletizing, your ore would have to be ground to a fineness of over 80 per cent minus 100 mesh. You might get by with a pelletizing operation with some grains coarser than this but, so far as I know, persons working on developing the pelletizing process have had all particles in the filter cake (concentrate ready for pelletizing) around minus 100 mesh and have not had any coarse particles in the cake.

Pilot plants working on the development of the pelletizing process are (1) Lebanan, Pennsylvania -- Bethlehem Steel Corporation (2) Aurora, Minnesota -- Erie Mining Company (3) Ashland, Kentucky managed by Oglebay Norton and Company, Hanna Building, Cleveland. So far as I know, these pilot plants working on pellatizing are not open for inspection at this time.

The H. A. Brassert Company of Pittsburgh have done some laboratory work on pelletizing and may have carried on some work on a pilot

plant scale on this form of agglomeration. Brassert are engineers and consultants on certain steel operations and have recently interested themselves in beneficiation and agglomeration of iron ores including magnetite. You might want to get in touch with them to see what service they could render you in regard to your pelletizing problems.

Now in answer to the four questions near the end of your letter:

1. The filter cake (magnetite concentrate) fed into the balling drum in which the pellets are formed contains between 9 and 10 per cent moisture.

2. No one has built a commercial-sized pelletizing plant to date. However, it is generally estimated that the cost of a pelletizing plant of a given capacity would be around 50 per cent of the cost of a sintering plant with the same capacity.

3. I have not seen any reliable figures on the cost of pelletizing. I have heard estimates, however, that pelletizing is expected to cost slightly less than sintering and should produce a superior product for blast furnace use.

4. It appears to be desirable to use adhesive agent in the balling operation of the pellets to give them superior wet strength over those formed without an adhesive. However, very good pellets have been made without using any adhesive. There are a number of adhesives that can used such as Bentonite, sodium metasilicate, sulfide of iron, and a large number of other substances, many of which are too expensive or are deleterious.

I trust I have given you the information you want but, if not, please let me know.

Very truly yours,

/s/ S. L. Kingsbury

Vice President

CLKingsbury
lgm

COPY

NICHOLS ENGINEERING & RESEARCH CORP.
70 PINE STREET
NEW YORK 5, N. Y.

August 6, 1951

C
O
P
Y

Unit Company, Incorporated
224 West 195th Street
Seattle 77, Washington

Attention Mr. R. C. Robinson

Gentlemen:

Your letters of July thirtieth and sixteenth have been referred to us, as we have taken over the business formerly conducted by the Dwight and Lloyd Sintering Company.

The magnetite concentrate you mention is rather coarse for the pelletizing process of agglomeration. For this treatment, it should run some 75 per cent minus 100 mesh and 25 per cent minus 200 mesh. Coarser material usually does not have sufficient adhesion to form pellets strong enough to stand the hardening furnace.

We believe the Dwight and Lloyd sintering process will be more appropriate. This operation consists in mixing about six per cent of fine solid fuel (coke or coal fines) with the concentrate and burning out the coal underforced draft to heat the concentrate to the sintering temperature. The product is a cellular aggregate known as sinter.

The process is described in the enclosed bulletin. It has long been standard treatment for fine concentrates such as you describe.

For your tonnage, you will need our size 42 inch bt 44 foot Dwight-Lloyd sintering machine. This size machine, complete with charge mixer, charge distributor, ignoter fan and motors costs $72,000 F.o. b. Netcong, New Jersey. The complete plant, including bin, conveyors,

building, etc. will cost approximately $300,000.

Drawing No. 4022, enclosed, will give you a general idea of the plant required. We hope you will write us more fully of your plans and requirements so that we can discuss thme more in detail.

Yours very truly,

NICHOLS ENGINEERING & RESEARCH CORP.

/s/ Reed W. Hyde
Reed. W. Hyder
Director of Metallurgy

RWH:mkg
Enclosure
cc: Sintering Machinery Corporation

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DINGS MAGNETIC SEPARATOR CO.
4740 W. Electric Ave.
Milwaukee, Wisconsin

Date March 21, 1951

TESTING LABORATORY REPORT

Magnetic Separation Test No. 8804

Test Made For Unit Company Inc.

Address 224 West 195th Steet, Seattle 77, Washington

Material Tested Sand Wt. in Lbs. per Cu. Ft. 94.7

Screen Analysis

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Plus | 20 | Mesh | | | | 6.4 | % |
| Minus | 20 | Mesh | Plus | 65 | Mesh | 59.7 | |
| " | 65 | " | " | 100 | " | 16.2 | |
| " | 100 | " | " | 150 | " | 12.5 | |
| " | 150 | " | " | 200 | " | 3.0 | |
| " | 200 | " | " | | | 2.2 | |
| | | | | | | 100.0 | % |

Type of Magnetic Separator Used For Test

Crockett Magnetic Separator Type HM

| Prod. | Weight in Pounds | % of Total Wt. | Remarks |
|---|---|---|---|
| A | 5.50 | 15.0 | Magnetic Concentrate |
| B | 31.25 | 85.0 | Non-Magnetics (Tailings) |
| Totals | 36.75 | 100.00 | |

NOTES: The above sample was run through a type HM Crockett Magnetic Separator having a belt width of 12 inches. The feed was in the form of a slurry which contained about 60% water. The capacity was estimated at about 7 tons of dry feed per hour. The gap between the bank of magnets and the feed pan was set at 1/2 inch.

A small amount of non-magnetic material was entrapped by the magnetic particles and carried over into the concentrate discharge. A second magnetic separator could be employed to remove the small amount of magnetics remaining in the tailings product.

C
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PITTSBURGH TESTING LABORATORY
PITTSBURGH, PA.

COPY

Order No. SE-485

Laboratory No. C109

REPORT

11-22-50

of

Analysis of Sand

For Unit Company, Inc.
224 West 195th
Seattle 77, Washington

Following are the results of sieve analysis, magnetite analysis, on a sample of sand submitted to us by the Unit Co. Inc.

Sieve Analysis:

| Size | Percentage of Total Sample | |
|---|---|---|
| Larger than #28 screen | 6.77 | by weights |
| #28 to #48 screen | 27.51 | " |
| #48 to #100 screen | 47.31 | " |
| Smaller than #100 screen | 18.41 | " |

Magnetite Determination:

| Size | Percentage of Size Fraction as Magnetite | |
|---|---|---|
| Larger than #28 | 33.9 | by weights |
| #28 to #48 | 24.4 | " |
| #48 to #100 | 41.0 | " |
| Smaller than #100 | 47.2 | " |

The magnetite determination was made by a magnetic separation method, the magnetite being obtained at an estimated purity of 80%. The percentage of the total sample as magnetite of this purity is therefore 37.1. Approximately 50% of the magnetite is in the #48 to #100 size fraction. Half of the remaining magnetite is in the size fraction smaller than #100 Screen.

If a more accurate determination of the iron is desired, an assay of each size fraction for iron is suggested.

Respectfully submitted,
PITTSBURGH TESTING LABORATORY

/s/ M. E. Johnson
District Manager

COPY

PITTSBURGH TESTING LABORATORY
PITTSBURGH, PA.

C O P Y

Order No. SE-485

Laboratory No. C117
File No. 33961.1

12-13-50

REPORT

of

Analysis of SAND

For Unit Co., Inc.
224 W. 195th Street
Seattle 77, Washington

Following are the results of sieve analysis and magnetite determination on a sample of sand submitted by the Unit Company. The sample was labeled "Composite sample of Whitechuck Sand taken November 8, 1950."

Sieve Analysis:

| Size | % of Total Sample |
|---|---|
| Larger than #30 screen | 23.3 |
| #30 - #50 | 34.0 |
| #50 - #100 | 30.6 |
| Smaller than #100 | 12.1 |

Magnetite Analysis:

| Size | % of Size Fraction Separable by Magnet |
|---|---|
| Larger than #30 screen | 31.3 |
| #30 - #50 | 15.8 |
| #50 - #100 | 22.1 |
| Smaller than #100 | 29.6 |

The two larger size fractions are estimated to be approximately 50% pure magnetite. The #50 - #100 and the minus #100 fractions are estimated to be 85% - 90% pure magnetite.

Analysis of Sand
Unit Co., Inc.

Utilizing the above results, one may calculate that of the total unseparated sample, 23% is appreciably magnetic. The distribution of the magnetic material is shown below.

| Size | Magnetic Material Expressed as % of unseparated Sample |
|---|---|
| Larger than #30 | 7.29 |
| #30 - #50 | 5.37 |
| #50 - #100 | 6.76 |
| Smaller than #100 | 3.58 |

Results of zircon analysis will be forwarded by our San Francisco office as soon as complete.

PITTSBURGH TESTING LABORATORY

/s/ M. E. Johnson

District Manager

COPY

LAUCKS LABORATORIES INC.
1008 WESTERN AVE.
SEATTLE 4, WASHINGTON

COPY

April 11, 1949 Report No. 105618

Unit Company Inc.
224 West 195th
Seattle, Washington

Gentlemen:

We hereby certify that we have made a quantitative spectrographic test and a fire assay of the sample of

ORE

submitted to us by you, and we have to report as follows:

Marked: A

| | Estimated Quantities |
|---|---|
| Silica ($SiO_2$) | 12% to 14% |
| Magnesium (MgO) | 0.8% |
| Iron ($Fe_3O_4$) | 80% to 90% |
| Calcium (CaO) | 0.6% |

Trace quantities of the following:

| | | | |
|---|---|---|---|
| Aluminum (Al) | Sodium (Na) | Cobalt (Co) | Potassium (K) |
| Lead (Pb) | Zinc (Zn) | Titanium (Ti) | Strontium (Sr) |
| Copper (Cu) | Nickel (Ni) | Manganese (Mn) | Chromium (Cr) |

| | | Value per Ton |
|---|---|---|
| Gold, Oz. Troy per Ton | Trace | --- |
| Silver, Oz. Troy per Ton | Trace | --- |

The elements shown in the above analysis are present as shown but they may not be recoverable by commercial methods.

Respectfully submitted,

LAUCKS LABORATORIES, INC.

By /s/ F. P. Owens

FPO:jk

COPY

View from top of deposit above original plant site, looking down the Sauk River Valley. Point from which picture was taken is 108 feet above the flat in the center of the view. Road in the center of the view leads from the plant to the Whitechuck road. Mountain Loop Highway crosses in the foreground.

Whitechuck

UNIT COMPANY, INC.
224 WEST 156th ST.
SEATTLE 77, WASH.

View from top of deposit above original plant site, looking down the Bear River Valley. Point from which picture was taken is 108 feet above the flat in the center of the view. Road in the center of the view leads from the plant to the Whitebunk road. Mountain Loop Highway crosses in the foreground.

View from flat (looking southerly). Top of bank at extreme upper right is 108 feet above the flat. Mountain Loop Highway crosses along the upper center. Excavated area of the deposit is the U shaped white portion above the Loop Highway.

Whitechuck

SEATTLE 77, WASH.

View from flat (looking southerly). Top of bank at extreme upper right is 108 feet above the flat. Mountain Loop Highway crosses along the upper center. Excavated area of the deposit is the U shaped white portion above the Loop Highway.

View looking across flat (looking Southerly). Top of bank above road is 108 feet above the flat, Mt. Loop Highway crosses along the upper center. Excavated area of deposit is the U shaped white part above the Loop Highway. Railroad in foreground is not in use, rails to Darrington have been removed.

Whitechuck Inc.

UNIT COMPANY, INC.
224 WEST 150th ST.
SEATTLE 77, WASH.

View looking across flat (looking Southerly).
Top of bank above road is 108 feet above the flat. Mt. Loop Highway crosses along the upper center. Excavated area of deposit is the U shaped white part above the Loop Highway. Railroad in foreground is not in use. rails to Darrington have been removed.

(Formerly) WHITECHUCK INC.

FEB 1 9 1952

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

Re: Docket No. [illegible] 1733[illegible]
Whitechuck, Incorporated
Exploration Project Application

Gentlemen:

We refer to your letters dated December 14, 1951, August 22, 1951, and July 3, 1951.

In your letter of July 3rd you requested that questions 17 to 23 inclusive, of Form [illegible]F-103, be answered, with answers to several other points to be covered also. It was necessary for us to carry out a great deal of work to properly answer the points brought up in your correspondence.

We were surprised that more work had not been accomplished on the beneficiation of the low grade Minnesota ores, as the writer while remodeling a cement plant in 1920 in St. Louis obtained information on the work then being carried out. At that time D. C. Jackling of Salt Lake City employed the Hardinge Company to carry out the mill tests on separating this low grade ore. It was found that this separation could be done but, as Mr. Jackling stated, they were twenty years too early.

In addition to answering the questions raised in your letter of July 3rd, we are enclosing copies of the following letters: Our letter to Mr. E. [illegible]. Davis dated August 31, 1951, note the first paragraph on how we obtained the magnetite ore; copy of Mr. E. [illegible]. Davis letter dated October 29, 1951, to which was attached a report from H. E. Taylor to [illegible]. [illegible]nde dated October 1, 1951, you will

Defense Minerals Administration

Whiteshuck Inc.
224 West 195
Seattle 77

note in this report the silica content was high (poor separation of sample on our part) and that the $TiO_2$ percentage of the feed was 9.84, all previous tests show a percentage of $TiO_2$ ranging from 9% to 10%; a letter from Reserve Mining Co. dated August 15, 1951; and a letter from Nichols Engineering and Research Corp. dated August 6, 1951. We further had a test made of our material run through a Ding Separator at Milwaukee, Wisconsin by T. Make of the Dings Magnetic Separator Co., copy of the test is attached.

Following are the answers to questions 17 through 23, as per your letter dated July 3, 1951.

17. Mine is not in production.
Proven metallurgical process of extraction of iron and pumice;
Pumice to be screened out,
Magnetic iron removed with Ding Magnetic Separators.
Cost of plant complete - $52,700.00

| | |
|---|---|
| Prepare site & building - - - - - - - | 7,200.00 |
| Feeder, washer, generator, etc. - - | 28,500.00 |
| Magnetic separators - - - - - - - - - | 17,000.00 |
| | $52,700.00 |

Cost of operating plant 24 hours per day

| | |
|---|---|
| Power - - - - - - - - - - - - - - | 24.00 |
| Gas, oil, repairs, misc. - - | 180.00 |
| Labor, 10 men $18.00 - - - | 180.00 |
| Overhead - - - - - - - - - - | 120.00 |
| Royalty - - - - - - - - - - - | 60.00 |
| Depreciation & interest - - | 75.00 |
| | $639.00 |

Production per 24 hours
Magnetite Iron Ore - 259.2 tons
(90% to 98% pure ore)
Cost of Iron Ore per ton extracted
$639.00 divided by 259.2 or $2.46 per ton

18. (a) Magnetite Iron Ore was a water bourn deposit in a former lake. Interspersed with layers of magnetic iron and sand, are strata of pumice and sand.

(b) See attached maps and assay data.

(c) Based upon the exposures now existing and holes excavated, there are five hundred acres with an average depth of fifty feet, resulting in an estimated 5,940,000 tons of magnetite iron.

Defense Minerals Administration

Whitechuck Inc.
224 West 195
Seattle 77

19. The magnetite or "blacksand" in this area is a concentration deposit in pumice, scoria, and a silica feldspar sand deposited in an old glacial lakebed by the Whitechuck River. The pumice and scoria originating from Glacier Peak volcanic action and the sands from disintegration of various igneous rocks cut by the Whitechuck River.

The magnetite occurs with the silica and feldspar sand and generally is consistent throughout the deposit from top to bottom. There are many exposures on the sides of the deposit showing the full depth. These faces have been thoroughly sampled along with some two hundred test holes.

Mineralogically the magnetite is relatively pure, phosphorus percentage being 0.02%, sulphur negligible 0.003%, and titanium 5.10%. Iron content 72% plus.

In addition to the various assays and tests attached, a reduction test of the magnetite was made at the University of Washington. A small pig was produced using an oil heat furnace and another pig was produced in a PCE furnace, using propane gas. The iron was high grade. The reduction of magnetite ($Fe_3O_4$) iron ore requires more heat, but if the ore contains small amounts of the elements sulphur and phosphorus it reduces to a high grade iron. With these elements being present as stated above the reduced iron was a hard, dense, light-colored iron of extra fine quality. In reducing the iron no coke was used, only charcoal. Charcoal was used to obtain an iron product equal to the famous Swedish iron. This iron can then be developed into the highest grade carbon steel, high speed tool steel, stainless steel, or special alloy steel.

The cost of pellatizin or sintering being so great, note previous costs submitted, it is felt that immediately treating the magnetite iron ore in an electric furnace and producing pig iron would be more economical. We are advised by personnel at the College of Mines, University of Washington, that the titanium would go off in the slag. We are further advised that high grade pig iron would have a ready market, both from steel mills and foundries, in the immediate trade area.

Cost of Lectromelt Furnace, installed complete:

| | |
|---|---|
| "OPT" furnace, electric sub-station, and control equipment . . . . . | $150,000.00 |
| 3 - 10 ton bottom pour ladles comp. . . . . | 10,000.00 |
| Freight on furnace, etc. . . . . | 6,000.00 |
| 50 - 12" electrodes . . . . . | 4,500.00 |
| Building, 60 feet by 120 ft. . . . . | 90,500.00 |
| 2 - 15 ton traveling cranes . . . . . | 40,000.00 |
| Runways, foundation, etc. . . . . | 35,000.00 |
| Molds . . . . . | 25,000.00 |
| Laboratory, office, bins, etc. . . . . | 35,000.00 |
| Total . . . . . | $396,500.00 |

Defense Minerals Administration

Whitechuck Inc.
224 West 195
Seattle 77

19. (Continued)

With the pig iron plant located at Darrington, Snohomish County, Washington; charcoal can be produced from waste material now left in logging usable timber.

In the reduction of magnetite iron ore, experience has shown that charcoal is superior to coal coke in the production of high grade iron.

In the manufacture of charcoal, the costs in this report are based on the process described in the April 1949, Vol. 1 No. 2, issue of The Trend in Engineering published at the University of Washington. This article was written by Bror L. Grondal, Professor of Forest Products and Piotr Zancsak, Research Fellow in the Engineering Experiment Station.

In the production of charcoal in large quantities, commercially important by-products are obtained. To obtain the required amount of charcoal, there will be extracted sixty tons of distillate. The further processing of this distillate is a subject that is of such scope and magnitude that it should be taken up as a separate report.

A steady market for mill waste and timber not suitable for timber products will be made available by this development. Much of the timber now wasted or left standing, due to it's non-commercial suitability, will assume a good commercial value. This timber which is now a fire hazard and a tremendous waste of our natural resources will, when utilized, mean - more jobs, value in place of waste, a supply of charcoal, and a supply of valuable by-products.

Eighty tons of charcoal will be required each day. This will necessitate the charring of 175 cords of fir, hemlock, or alder per day.

Yield in charcoal is 40% plus by weight.

Yield in distillate is 30% by weight of which 10% to 12% are phenols. This distillate would be stored in pools, for future use in markets would develop once it was known that sizeable quantities were available.

Improved charcoal from wood with a greater yield of condensable distillates would be produced in the pyrolysis of wood in a process which includes immersion of the wood in kerosene, with a steel retort as a container. This retort is equipped with a condenser and receiver. The kerosene is recaptured and re-used with slight loss. Only 8 hours, instead of the 36 hours under ordinary conditions of dry distillation, are required to complete this process.

Plant, equipment, and productions costs using forest waste:

Electricity is to be used for power.
The raw wood is required to be reduced to cubes of 4" or smaller, to chips, or sawdust.

Defense Minerals Administration

Whitechuck Inc.
224 West 195
Seattle 77

19. (Continued)

| | |
|---|---|
| Cost of wood producing plant and equipment, including 4 hogs with individual 125 HP motors . . . . . | $125,000.00 |
| Cost of charring plant, 3 retorts with necessary equipment . . . . . | 360,000.00 |
| | $485,000.00 |

| | |
|---|---|
| Cost of producing wood and delivering to plant . . . . | $5.50 per cord |
| Cost of grinding wood . . . | 0.50 per cord |

At 40% yield:

| | |
|---|---|
| Cost of raw material per ton of charcoal . . | $13.00 |
| Cost of charring, per ton of charcoal . . . | 8.00 |
| Cost to produce improved charcoal per ton . | $21.00 |

We are further advised that the distillate would sell for further processing at over $200.00 per ton or over $12,000.00 per day.

20. Magnetite iron ore, a water deposition in the form of sand.

21.

| | Cost | Time |
|---|---|---|
| Separation Plant | $52,700.00 | Six Months |
| Electric Furnace Plant | 396,000.00 | Twelve Months |
| Charcoal Plant | 485,000.00 | Twelve Months |

This will give a minimum yearly production of 52,800 tons of very high grade pig iron.

22. See Items 18 and 19.

23. Mining & Milling for six months:

| | |
|---|---|
| (a) Labor | |
| 10 Laborers @$18.00 per day . . . . . | $21,600.00 |
| (b) Supervisors | |
| 3 Superintendents @$25.00 per day . . . . | 9,000.00 |
| 2 Office Workers @$15.00 per day . . . . | 3,600.00 |
| 2 Engineers @$30.00 per day . . . . . | 7,200.00 |
| 1 Manager @$20.00 per day . . . . . | 2,400.00 |
| (c) None | |
| (d) Site preparation & building . . . . . | 7,200.00 |
| Sub-Total . . . | $51,000.00 |

Defense Minerals Administration

Whitechuck Inc.
224 West 195
Seattle 77

23. (Continued)

Mining & Milling for six months:

| | | |
|---|---|---|
| | Balance brought forward | $ 51,000.00 |
| (e) | Feeder, washer, generator, etc. | 28,500.00 |
| | Magnetic separators | 17,000.00 |
| (f) | None | |
| (g) | None | |
| (h) | Miscellaneous materials & supplies | 500.00 |
| (i) | Power, water, etc. @$24.00 per day | 2,850.00 |
| | Total | $ 99,850.00 |

Smelting for twelve months:

| | | |
|---|---|---|
| (a) | Labor | |
| | 3 Melters @$30.00 | $ 21,600.00 |
| | 12 Helpers @$20.00 | 57,600.00 |
| | 1 Metallurgist @$30.00 | 7,200.00 |
| (b) | Supervisors | |
| | 1 Superintendent @$25.00 | 6,000.00 |
| | 2 Officer Workers @$15.00 | 7,200.00 |
| | 1 Chemical Engineer @$30.00 | 7,200.00 |
| (c) | None | |
| (d) | Site preparation & building | 160,500.00 |
| (e) | "OPT" furnace, electric sub-station and control equipment | 150,000.00 |
| | 3 - 10 ton bottom pour ladles | 10,000.00 |
| | 50 - 12" electrodes | 4,500.00 |
| | 2 - 15 ton traveling cranes | 40,000.00 |
| | Molds | 25,000.00 |
| | Freight on equipment | 6,000.00 |
| (f) | None | |
| (g) | None | |
| (h) | Miscellaneous materials & supplies | 5,000.00 |
| (i) | Power, water, etc. @$1,050.00 per day | 12,600.00 |
| | Total | $ 520,400.00 |

Charcoal Production for twelve months:

| | | |
|---|---|---|
| (a) | Labor | |
| | 2 Chargers @$30.00 | 14,400.00 |
| | 20 Wood Workers @$25.00 | 120,000.00 |
| | 10 Plant Operators @$18.00 | 43,200.00 |
| (b) | Supervisors | |
| | 2 Chemical Engineers @$30.00 | 14,400.00 |
| | 1 Superintendent @ $30.00 | 7,200.00 |
| | 2 Office Workers @ $15.00 | 7,200.00 |
| | Sub-Total | 206,400.00 |

Defense Minerals Administration

Whitehchuck Inc.
224 West 195
Seattle 77

23. (Continued)

Charcoal Production for twelve months:

| | |
|---|---|
| Balance brought forward . . . . . | $206,400.00 |
| (c) None | |
| (d)&(e) | |
| Wood producing plant and equipment . . | 125,000.00 |
| Charring plant and equipment . . . . . | 360,000.00 |
| (f) None | |
| (g) None | |
| (h) Miscellaneous materials & supplies . . | 6,000.00 |
| (i) Power, water, etc. @ $90.00 per day . . | 1,080.00 |
| | $698,480.00 |

24. Note Item 21, cost of each operation is shown separately and the time needed to put each operation in production. The time required for each operation is based on the ability to obtain delivery of the equipment needed.

Again referring to your letter dated July 3, 1951, we believe all questions have been answered in the preceding items. Any data or costs not covered will be sent you at once.

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.

Whitehhuck Inc.

Feb. 19, 1952
(Date)

Chairman of the Board
(Title)

COPY COPY

August 31, 1951

Mr. E. W. Davis
University of Minnesota
Institute of Technology
Mines Experiment Station
Minneapolis 14, Minnesota

Dear Mr. Davis:

We refer to your letter of August 14, 1951.

We are sending you under separate cover about 21 pounds of the magnetic iron ore referred to in our letter of August 7th. This ore was obtained by running the sand through a Humphrey Spiral Concentrator (manufactured by the Humphreys Investment Co., Denver, Colorado). The ore was extracted in the above machine at the University of Washington. There was available a magnetic iron ore separator at the University which was used in cleaning the product from the Spiral Concentrator. This magnetic separator was not very efficient, so you will find the sample we are sending you will contain more silica and detritus than if the material had been run through a modern magnetic separator.

Your advice as to whether or not this material can be pellatized and put into the proper condition for blast furnace smelting will be greatly appreciated.

Thank you for your kindness in performing this research.

Very truly yours,

UNIT COMPANY INC.

/s/ R. C. Robinson

R. C. Robinson

RCR:e

UNIVERSITY OF MINNESOTA

Institute of Technology

Minneapolis 14

copy

Mines Experiment Station

October 29, 1951

Mr. R. C. Robinson
Unit Company Inc.
224 West 195th Street
Seattle 77, Washington

Dear Mr. Robinson:

I am attaching a copy of the report on the sample of magnetite sand that you submitted in August. This material did not contain enough fine material for satisfactory balling and, therefore, it was ground finer.

It was found that after grinding to 40% minus 325 mesh, satisfactory balls and pellets could be produced, although still finer grinding--50% minus 325 mesh--is recommended. Good, strong pellets can be made from this material but they are not of high quality, chemically, since they contain 17.86% $SiO_2$ and 9.38% $TiO_2$. A small sample of the pellets is being sent to you under separate cover.

A magnetic separation test was made after grinding a sample of this concentrate to minus 100 mesh. This is a standard magnetic tube test. The results show that the $TiO_2$ is very closely associated with the magnetite and concentrates with the iron. Grinding and magnetic concentration will reduce the silica materially but will not reduce the $TiO_2$.

If you are interested in the agglomeration of this material commercially, we may be able to assist you a little later.

Very truly yours,

/s/ E. W. Davis

E. W. Davis

EWD:MM

copy

COPY

October 1, 1951

COPY

To: Mr. H. H. Wade

From: L. S. Taylor

Subject: Unit Company Inc. Magnetite Concentrate Pellatizing Tests

Sample

This concentrate had been made on a Humphrey Spiral Concentrator and, consequently, carried little slime. However, this sample contained much gangue, analyzing only 42.91% total iron, 18.95% Fe++ and 0.03% S.

Screen Sizings

| Size | As received % Wt. | Final Test Grind % Wt. |
|---|---|---|
| Plus 48 Mesh | 12.60 | 0 |
| " 65 " | 23.00 | 0.30 |
| "100 " | 30.61 | 2.70 |
| " 150 " | 20.87 | 15.30 |
| " 200 " | 6.05 | 18.10 |
| " 325 " | 4.84 | 24.00 |
| Minus 325 " | 2.03 | 39.60 |

Pelletizing Tests

Balling drum tests were first made on the original sample and after grinding to 29% minus 325 mesh but even after this grind the agglomeration was weak and the pellets were unsatisfactory.

After grinding further to minus 39.60% minus 325 mesh pellets were rolled in the normal manner at 8.75% moisture and gave no trouble, but the green strengths were a little under standard for furnace feed. The wet strength for plus 1/2" minus 3/4" pellets averaged 1.78 pounds and the dry strength averaged 1.48 pounds for this grind. This concentrate would, therefore, require a little finer grinding to bring the pellet quality to standard, unless some binder is used to produce a highter dry strength. Grinding to 50% minus 325 mesh should raise the green strength sufficiently, without an additive.

**Burned Pellets**

Pellets made from the test grind (39.6% minus 325 mesh) were heated in a gas fired furnace to 1100° C. This temperature was high enough to burn them to a very satisfactory product. Tested under compression the strength of the burned pellets averaged 460 pounds.

**Analysis**

43.50% Fe
15.20% Fe++
17.86% $SiO_2$
4.23% $Al_2O_3$
9.38% $TiO_2$
2.14% CaO
5.46% MgO

**Magnetic Tube Test**

| | % Wt. | %Fe | %$TiO_2$ | Fe Units | % Mag. Fe | %Fe Rec. | %$TiO_2$ Rec. |
|---|---|---|---|---|---|---|---|
| Feed | 100.00 | 43.50 | 9.84 | 43.50 | 42.295 | | |
| Concentrate | 74.90 | 56.43 | 12.72 | 42.295 | | 97.37 | 95.83 |
| Tailing | 25.10 | 4.80 | 1.63 | 1.205 | | | |

LETTIGM

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RESERVE MINING COMPANY
EXECUTIVE OFFICES
GUILDHALL BUILDING
CLEVELAND 15, OHIO

COPY

August 15, 1951

Mr. R. C. Robinson
Unit Company Inc.
224 West 195th Street
Seattle 77, Washington

Dear Sir:

This letter is in answer to yours of August 7, 1951.

From the screen analysis given in your letter, it appears that the concentrate made from your ore is on the fine side for sintering, but I could be wrong on this point. There are other characteristics besides the fineness of the ore which determine its suitability for agglomerating by the sintering process.

If you want to investigate the possibility of sintering your ore, I would suggest you get in touch with Arthur G. McKee and Company, 2300 Chester Avenue, Cleveland, Ohio. The McKee Company are outstanding in engineering work on sintering, particularly Mr. Morgan of that company. Based on some figures which are now a little bit old and therefore may not be too accurate, a sintering plant with 1000 ton per day capacity should cost in the neighborhood of $2,000,000 to $2,500,000.

For pelletizing, your ore would have to be ground to a fineness of over 80 per cent minus 100 mesh. You might get by with a pelletizing operation with some grains coarser than this but, so far as I know, persons working on developing the pelletizing process have had all particles in the filter cake (concentrate ready for pelletizing) around minus 100 mesh and have not had any coarse particles in the cake.

Pilot plants working on the development of the pelletizing process are (1) Lebanon, Pennsylvania -- Bethlehem Steel Corporation (2) Aurora, Minnesota -- Erie Mining Company (3) Ashland, Kentucky managed by Oglebay Norton and Company, Hanna Building, Cleveland. So far as I know, these pilot plants working on pelletizing are not open for inspection at this time.

The H. A. Brassert Company of Pittsburgh have done some laboratory work on pelletizing and may have carried on some work on a pilot

plant scale on this form of agglomeration. Brassert are engineers and consultants on certain steel operations and have recently interested themselves in beneficiation and agglomeration of iron ores including magnetite. You might want to get in touch with them to see what service they could render you in regard to your pelletizing problems.

Now in answer to the four questions near the end of your letter:

1. The filter cake (magnetite concentrate) fed into the balling drum in which the pellets are formed contains between 9 and 10 per cent moisture.

2. No one has built a commercial-sized pelletizing plant to date. However, it is generally estimated that the cost of a pelletizing plant of a given capacity would be around 50 per cent of the cost of a sintering plant with the same capacity.

3. I have not seen any reliable figures on the cost of pelletizing. I have heard estimates, however, that pelletizing is expected to cost slightly less than sintering and should produce a superior product for blast furnace use.

4. It appears to be desirable to use adhesive agent in the balling operation of the pellets to give them superior wet strength over those formed without an adhesive. However, very good pellets have been made without using any adhesive. There are a number of adhesives that can used such as Bentonite, sodium metasilicate, sulfide of iron, and a large number of other substances, many of which are too expensive or are deleterious.

I trust I have given you the information you want but, if not, please let me know.

Very truly yours,

/s/ S. L. Kingsbury

Vice President

CLKingsbury
lgm

COPY

NICHOLS ENGINEERING & RESEARCH CORP.
70 WALL STREET
NEW YORK 5, N. Y.

August 6, 1951

Unit Company, Incorporated
224 West 135th Street
Seattle 77, Washington

Attention Mr. L. E. Robinson

Gentlemen:

Your letters of July thirtieth and sixteenth have been referred to us, as we have taken over the business formerly conducted by the Wright and Floyd Sintering Company.

The composite concentrate you mention is rather coarse for the pelletizing process of agglomeration. For this treatment, it should run some 75 per cent minus 100 mesh and 25 per cent minus 325 mesh. Coarser material usually does not have sufficient adhesion to form pellets strong enough to stand the handling furnace.

We believe the Wright and Floyd sintering process will be more appropriate. This operation consists in mixing about six per cent of fine solid fuel (coke or coal fines) with the concentrate and burning out the coal underneath draft to heat the concentrate to the sintering temperature. The product is a cellular aggregate known as sinter.

The process is described in the enclosed bulletin. It has long been standard treatment for fine concentrates such as you describe.

For your tonnage, you will need our size 42 inch by 14 foot Wright-Floyd sintering machine. This size machine, complete with charge mixer, charge distributor, igniter fan and motors costs $72,000 F.o.b. Paterson, New Jersey. The complete plant, including bin, conveyors,

building, etc. will cost approximately $300,000.

Trucks No. [illegible], enclosed, will give you a general idea of the plans involved. We hope you will write us more fully of your plans and requirements so that we can discuss them more in detail.

Yours very truly,

[illegible]

/s/ [illegible]
[illegible]
[illegible] of Intelligence

[illegible]
[illegible]
cc: Interior Builder, Corporation

COPY

[illegible] MAGNETIC SEPARATOR CO.
4740 W. Electric Ave.
Milwaukee, Wisconsin

Date March 21, 1951

TESTING LABORATORY REPORT

Magnetic Separation Test No. 8804

Test Made For Unit Company Inc.

Address 224 West 195th Street, Seattle 77, Washington

Material Tested Sand Wt. in Lbs. per Cu. Ft. 94.7

Screen Analysis

| | | | | | |
|---|---|---|---|---|---|
| Plus | 20 Mesh | | | | 6.4 % |
| Minus | 20 Mesh | Plus | 65 | Mesh | 59.7 |
| " | 65 | " " | 100 | " | 16.2 |
| " | 100 | " " | 150 | " | 12.5 |
| " | 150 | " " | 200 | " | 3.0 |
| " | 200 | " | | | 2.2 |
| | | | | | 100.0 % |

Type of Magnetic Separator Used For Test

Crockett Magnetic Separator Type HM

| Prod. | Weight in Pounds | % of Total Wt. | Remarks |
|---|---|---|---|
| A | 5.50 | 15.0 | Magnetic Concentrate |
| B | 31.25 | 85.0 | Non-Magnetics (Tailings) |
| Totals | 36.75 | 100.00 | |

NOTES: The above sample was run through a type HM Crockett Magnetic Separator having a belt width of 12 inches. The feed was in the form of a slurry which contained about 60% water. The capacity was estimated at about 7 tons of dry feed per hour. The gap between the bank of magnets and the feed pan was set at 1/2 inch.

A small amount of non-magnetic material was entrapped by the magnetic particles and carried over into the concentrate discharge. A second magnetic separator could be employed to remove the small amount of magnetics remaining in the tailings product.

COPY

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PITTSBURGH TESTING LABORATORY
PITTSBURGH, PA.

Order No. SE-485 Laboratory No. C109

REPORT 11-22-50

of

Analysis of Sand

For Unit Company, Inc.
224 West 195th
Seattle 77, Washington

---

Following are the results of sieve analysis, magnetite analysis, on a sample of sand submitted to us by the Unit Co. Inc.

**Sieve Analysis:**

| Size | Percentage of Total Sample | |
|---|---|---|
| Larger than #28 screen | 6.77 | by weights |
| #28 to #48 screen | 27.51 | " |
| #48 to #100 screen | 47.31 | " |
| Smaller than #100 screen | 18.41 | " |

**Magnetite Determination:**

| Size | Percentage of Size Fraction as Magnetite | |
|---|---|---|
| Larger than #28 | 33.9 | by weights |
| #28 to #48 | 24.4 | " |
| #48 to #100 | 41.0 | " |
| Smaller than #100 | 47.2 | " |

The magnetite determination was made by a magnetic separation method, the magnetite being obtained at an estimated purity of 80%. The percentage of the total sample as magnetite of this purity is therefore 37.1. Approximately 50% of the magnetite is in the #48 to #100 size fraction. Half of the remaining magnetite is in the size fraction smaller than #100 Screen.

If a more accurate determination of the iron is desired, an assay of each size fraction for iron is suggested.

Respectfully submitted,
PITTSBURGH TESTING LABORATORY

/s/ H. F. Johnson
District Manager

COPY

PITTSBURGH TESTING LABORATORY
PITTSBURGH, PA.

COPY

Order No. [illegible]-485

Laboratory No. C117
File No. 33961.1

12-13-50

REPORT

of

Analysis of SAND

For Unit Co., Inc.
224 N. 195th Street
Seattle 77, Washington

Following are the results of sieve analysis and magnetite determination on a sample of sand submitted by the Unit Company. The sample was labeled "Composite sample of Whitechuck Sand taken November 8, 1950."

**Sieve Analysis:**

| Size | % of Total Sample |
|---|---|
| Larger than #30 screen | 23.3 |
| #30 - #50 | 34.0 |
| #50 - #100 | 30.6 |
| Smaller than #100 | 12.1 |

**Magnetite Analysis:**

| Size | % of Size Fraction Separable by Magnet |
|---|---|
| Larger than #30 screen | 31.3 |
| #30 - #50 | 15.8 |
| #50 - #100 | 22.1 |
| Smaller than 100 | 29.6 |

The two larger size fractions are estimated to be approximately 50% pure magnetite. The #50 - #100 and the minus #100 fractions are estimated to be 85% - 90% pure magnetite.

Analysis of Sand
Unit Co., Inc.

Utilizing the above results, one may calculate that of the total unseparated sample, 23% is appreciably magnetic. The distribution of the magnetic material is shown below.

| Size | Magnetic Material Expressed as % of unseparated Sample |
|---|---|
| Larger than #30 | 7.29 |
| #30 - #50 | 5.37 |
| #50 - #100 | 6.76 |
| Smaller than #100 | 3.58 |

Results of zircon analysis will be forwarded by our San Francisco office as soon as complete.

PITTSBURGH TESTING LABORATORY

/s/ M. E. Johnson

District Manager

COPY

COPY

LAUCKS LABORATORIES INC.
1008 WESTERN AVE.
SEATTLE 4, WASHINGTON

April 11, 1949

Report No. 105618

Unit Company Inc.
224 West 195th
Seattle, Washington

Gentlemen:

We hereby certify that we have made a quantitative spectrographic test and a fire assay of the sample of

ORE

submitted to us by you, and we have to report as follows:

Marked: A

| | Estimated Quantities |
|---|---|
| Silica ($SiO_2$) | 12% to 14% |
| Magnesium (MgO) | 0.8% |
| Iron ($Fe_3O_4$) | 80% to 90% |
| Calcium (CaO) | 0.6% |

Trace quantities of the following:

| | | | |
|---|---|---|---|
| Aluminum (Al) | Sodium (Na) | Cobalt (Co) | Potassium (K) |
| Lead (Pb) | Zinc (Zn) | Titanium (Ti) | Strontium (Sr) |
| Copper (Cu) | Nickel (Ni) | Manganese (Mn) | Chromium (Cr) |

| | | Value per Ton |
|---|---|---|
| Gold, Oz. Troy per Ton | Trace | --- |
| Silver, Oz. Troy per Ton | Trace | --- |

The elements shown in the above analysis are present as shown but they may not be recoverable by commercial methods.

Respectfully submitted,

LAUCKS LABORATORIES, INC.

By /s/ F. P. Owens

FPO:jk

COPY

View from top of deposit above original plant site, looking down the Sauk River Valley. Point from which picture was taken is 108 feet above the flat in the center of the view. Road in the center of the view leads from the plant to the Whitechuck road. Mountain Loop Highway crosses in the foreground.

Whitechuck

UNIT COMPANY, INC.
224 WEST 16TH ST.
SEATTLE 77, WASH.

View from flat (looking southerly). Top of bank at extreme upper right is 108 feet above the flat. Mountain Loop Highway crosses along the upper center. Excavated area of the deposit is the U shaped white portion above the Loop Highway.

white chuck

UNIT COMPANY
22[illegible] WEST 13[illegible]TH ST.
SEATTLE 77, WASH.

View looking across flat (looking Southerly). Top of bank above road is 108 feet above the flat, Mt. Loop Highway corsses along the upper center. Excavated area of deposit is the U shaped white part above the Loop Highway. Railroad in foreground is not in use, rails to Darrington have been removed.

Whitechuck Inc.

UNIT COMPANY, INC.
224 WEST 130th ST.
SEATTLE 77, WASH.

View looking across flat (looking southerly). Top of bank above road is 108 feet above the flat. Mt. Loop Highway crosses along the upper center. Excavated area of deposit is the U shaped white part above the Loop Highway. Railroad in foreground is not in use, rails to Darrington have been removed.

IN REPLY REFER TO:

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

February 7, 1952

To: George E. Selfridge, DMEA

From: Martha Carr, USGS

Subject: Exploration application (Estimated cost not specified) DMA 1733 X Magnetic black sand
Whitechuck Inc.,
224 W. 195
Seattle 77, Washington

Property: The property is located east and southeast of the confluence of the Whitechuck and Sauk Rivers in the Snohomish County mining district, Snohomish County, Washington. The areas are described as follows:

Sauk #1, N½ of the N½, Sec. 24, T31N, R10EWM
Sauk #2, S½ of S½ of Sec. 13, T31N, R10EWM
Sauk #3, N½ of S½ of Sec. 13, T31N, R10EWM
Sauk #4, NW¼ of SW¼ of Sec. 18, T31N, R11EWM
SW¼ of SW¼ of Sec. 18, T31N, R11EWM
NW¼ of NW¼ of Sec. 19, T31N, R11EWM
Sauk #5, E½ of NW¼ of Sec. 19, T31N, R11EWM
SW¼ of NW¼ of Sec. 19, T31N, R11EWM
SE¼ of NE¼ of Sec. 24, T31N, R10EWM
Sauk #6, S½ of NW¼ of Sec. 18, T31N, R11EWM
E½ of SW¼ of Sec. 18, T31N, R11EWM
Sauk #7, S½ of NW¼ of NE¼ of Sec. 13, T 31N, R10EWM
N½ of SW¼ of NE¼ of Sec. 13, T31N, R10EWM
S½ of SE¼ of NW¼ of Sec. 13, T31N, R10EWM
NE¼ of SE¼ of NW¼ of Sec. 13, T31N, R10EWM

The nearest town is Darrington (on the Northern Pacific Railway), 10 miles by gravel road west of the deposit.

Proposal: No specific proposal to prospect the property has been made by the applicant. It is assumed that he plans to produce iron as a byproduct of the pumice; then concentrate and pelletize the magnetite, the reserves of which he estimates to be 5,940,000 tons.

Geology: No specific information concerning the deposit is contained in the Survey's files. A statement of the reported occurrence of iron ore in the area is made in a State report. According to the applicant, the deposit of magnetic black sand is in flat benchland and has a depth of 100 to 150 feet. No map showing

the known areal extent has been furnished. The overburden, of silty soil mixed with pumice, is 6 to 18 inches thick. The pumice in the deposit consists generally of about 40 percent in volume.

Recommendation: A map showing the known areal extent of the deposit and distribution of the excavated test holes, with logs of the holes, if available, is needed. A specific proposal and estimated cost should also be obtained from the applicant before a recommendation can be made.

Martha Carr

FILE COPY
SURNAME:

100

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

DEC 14 1951

Mr. R. C. Robinson
Whitechuck, Incorporated
224 West 195th Street
Seattle 77, Washington

Re: Docket No. DMEA 1733X
Whitechuck, Incorporated
Exploration Project Application

Dear Mr. Robinson:

In your letter of August 27 you wrote that you were sending a sample of the magnetic iron ore from your deposit to Mr. E. W. Davis, Mining Experimental Station, University of Minnesota, to determine whether or not the ore could be pellatized. Until these test data, together with the information requested in the letter of Mr. Paul E. Pesonen, dated July 3, 1951 are received, we will not be able to process your application.

Your application is being placed in an inactive file until we have further information from you.

Sincerely yours,

(signed) FRANK E. JOHNSON (fw)

Acting Administrator
Defense Minerals Exploration
Administration

FLKnouse/meb
12/11/51
cc to: Adm.Reading File
Reports & Records
Mr. Mittendorf
Field Team,Reg.II(2)
Mr. Pesonen
Mr. Thayer
Mr. Knouse
Docket

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

December 6, 1951

Memorandum:

To: Acting Administrator
Defense Minerals Exploration
Administration

From: Mr. Robert H. Ridgway
United States Bureau of Mines
Interior Building - Room 3511

Subject: Docket No. DMA - 1733X
Whitechuck, Incorporated
Snohomish County, Washington
Exploration Project Application

I am returning the subject docket without recommendation, but with the following comments:

Iron ore requirements for consumption by the western steel industry are supplied principally from deposits in Utah and California at a price substantially below that paid by eastern consumers. It is doubtful if a beneficiated ore, produced from a low grade deposit, could approach competitive conditions even if the deposit were nearer to consuming centers. In the absence of evidence in this respect, no recommendation can be made. This information was requested in Mr. Pesonen's letter of July 3, 1951, and has not been received as of this date.

Robert H. Ridgway, Chief
Ferrous Metals & Alloys Branch

Enclosure

OFFICE OF THE ADMINISTRATOR

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

November 26, 1951

Memorandum

To: Mr. R. H. Ridgeway USBM — Room 3511
Mr. T. P. Thayer USGS
General Services Building
Room 5216

From: ACTING Administrator
Defense Minerals Exploration
Administration

Subject: Docket No. DMA - 1733X
Whitechuck, Incorporated
Snohomish County, Washington
Exploration Project Application

Attached hereto is the complete subject Docket containing correspondence to and from the applicant and DMEA, together with the completed application on Form MF-103, and map of the project.

Please review the above-subject application and return it together with your findings and recommendations to this office.

Enclosure

(Formerly)

WHITECHUCK INC.
UNIT COMPANY INC.
224 WEST 195TH ST.
SEATTLE 77, WASHINGTON

DEVELOPMENT
CONSTRUCTION

OPERATION
MANAGEMENT

August 27, 1951

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
AUG 28 1951

Mr. Tom Lyon, Director
Supply Division
Defense Minerals Administration
Washington 25, D. C.

Re: DMA-1733X - Exploration loan, Sauk 1 to 7, inclusive, Snohomish County, Washington

My dear Mr. Lyon:

We have just received your letter dated August 22, 1951.

We have delayed in answering the letter dated July 3, 1951 written by the Acting Chief of the Iron Ores Branch because we did not have all the data. We have everything required in his letter except the details on pellatizing the fine magnetic sands to a merchantable structure. We have contacted several engineering firms in the East, but as yet do not have the data which we feel would answer the question raised in the last paragraph of the above cited letter.

Amongst the organizations contacted was the University of Minnesota, Mr. E. W. Davis, Mines Experiment Station. We are sending him a sample of our magnetic iron ore upon which he will make tests and let us know whether or not the material can be pellatized. As soon as we have this information we will forward it to you at once.

Thanking you for your interest in this matter, we are

Very truly yours,

WHITECHUCK INC.

R. C. Robinson

R. C. Robinson

RCR:e

360

FILE COPY
SURNAME:

Pesonen

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

A.E.C.

AUG 22 1951

Mr. R. C. Robinson
Whitechuck, Inc.
224 West 195th Street
Seattle 77, Washington

Subject: DMA-1733X - Exploration loan, Sauk 1 to 7, inclusive, Snohomish County, Washington.

My dear Mr. Robinson:

On July 3, 1951, the Acting Chief of the Iron Ores Branch wrote you stating that you had failed to present all of the details requested in the application form MF-103, and that no further action could be taken on your application until this information was received.

In the event that no reply is received from you regarding this matter within 60 days, we will assume that you are not now interested in such a loan, and we will record your application as withdrawn.

This action will not, however, preclude you from submitting at a later date an application for a loan or for any other type of assistance that may be available under the provisions of the Defense Production Act.

Sincerely yours,

BF 8/22

Tom Lyon

Tom Lyon, Director
Supply Division

md

Copy to: Acting Administrator
Mr. Lyon
DMA Field Team, Region II
Reports & Records
Mr. Pesonen
Docket

FILE COPY
SURNAME:

PESONEN

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

July 3, 1951

Mr. R. C. Robinson
Whitechuck, Inc.
224 West 195th Street
Seattle 77, Washington

Subject: DMA-1733X - Exploration loan, Sauk 1 to 7, inclusive, Snohomish County, Washington.

My dear Mr. Robinson:

Your application for an exploration loan at the subject property has been reviewed by the Iron Ores Branch. The application fails to present all of the details requested in the application form MF-103, and further processing is therefore being held in abeyance pending the receipt of this information.

It is apparent that the deposit has been previously explored by over 200 holes for the pumice content and that, as the magnetite content is only about 15 percent by volume of the original crude material, it cannot qualify as an exploration project for iron ore.

We also note that 30 to 50 percent of the magnetite is less than 100 mesh in a screen test and contains 5.1 percent titanium.

In addition to answering questions 17 to 23, inclusive, of form MF-103, we would appreciate your detailed costs by proven metallurgical processes, and the profits you expect from an integrated pumice-magnetite operation. We would also appreciate details on pelletizing the fine magnetite sands to a merchantable structure, and your market for the resultant product containing 5.1 percent titanium.

Very truly yours,

PEPesonen:md

Paul E. Pesonen, Acting Chief
Iron Ores Branch

Copy to: Adm. reading file
Mr. Lyon
Mr. Strobel
Mr. Pesonen
Files

FILE COPY
SURNAME:

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

June 28, 1951

Mr. R. C. Robinson
224 West 195
Seattle 77, Washington

Subject: DMA-1733X
Re: Exploration Loan -
Sauk #1, 2, 3, 4, 5, 6, 7

My dear Mr. Robinson:

Receipt is acknowledged of your application and attachments of June 13, 1951 for an exploration loan under the Defense Production Act of 1950.

The application was assigned Docket Number DMA-1733X and referred to Mr. Paul Pesonen, Chief, Iron Branch on June 27, 1951.

In any future correspondence relating to your application, kindly refer to DMA-1733X.

Sincerely yours,

LANDON F. STROBEL
jc

Landon F. Strobel
Executive Secretary

L. F. Strobel:jc
cc: Strobel
✓File
Pesonen
Lyon

Sauk 1733

dma 1733X

Rec'd Iron Ore Br. 6/28/51

WHITECHUCK, INC.

224 West 195th St.,

SEATTLE (77), WASHINGTON

June 20, 1951

Defense Minerals Administration,
Department of the Interior,
Washington (25), D. C.

Gentlemen:

SUBJECT: APPLICATION - PURSUANT TO MINERAL ORDER 5, UNDER DEFENSE PORDUCTION ACT OF 1950.

Submitted herewith - in quadruplicate - are the following:

1. Form MF-103 - Application
   Accompanying sheets number 1 to 7
2. Lease agreement - October 4, 1947
3. " " - March 14, 1948
4. Balance Sheet - Dec. 31, 1950
5. Profit & Loss Statement Dec. 31, 1950.

Also enclosed are the following:

3 photographs
3 Blueprints.

The Seattle Chamber of Commerce, upon advice received from your Mr. A. M. Weissenborn, suggested that we forward the above to you.

We shall greatly appreciate any information which you might furnish as to the status of this application.

Very truly yours,

WHITECHUCK, INC.

Edw. F. Murray

EDW. F. MURRAY
Treas.

Form MF-103
(April 1951)

U. S. DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

Budget Bureau No. 42-R1035.
Approval expires 6-30-51.

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

DO NOT FILL IN THIS BLOCK

Docket No. dma 1733X

Date received 6-25-51

Participation

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
JUN 25 1951
LANDON F. [illegible]
Executive Secretary

Name and address of applicant

Whitechuck Incorporated
224 West 195
Seattle 77, Washington

Date June 13, 1951

FILL IN THIS BLOCK

Date of application

Estimated cost

Mineral or metal Magnetite Iron

Percentage of Government participation

Location of mine Confluence of Whitechuck &
Suiak Rivers, Snohomish Co., Washington

Date of filing MF-100

DMA Docket Number, if available

## INSTRUCTIONS

Read Mineral Order 5, Regulations Governing Government Aid in Defense Projects, before completing this application. Submit four signed copies of the application to Defense Minerals Administration, Department of the Interior, Washington 25, D. C., or to the nearest field executive officer thereof, with your name and address on each sheet of the application and all accompanying papers. If any question is inapplicable, or if you cannot answer it, so state on the form. Where the space provided for answer is insufficient, answer on a separate sheet, annex it to the application form, and refer to it in space for answer. If the application is approved, you will be presented with an exploration project contract on Form MF-200, for your signature.

## THE APPLICANT

*1. Is applicant an individual, partnership, or corporation? Corporation
*2. If a partnership, state names and addresses of partners. (See Attached
*3. If a corporation, state names and addresses of officers, directors, and five largest stockholders. (Sheet #1
*4. Describe the mining and general business experience of (*a*) the applicant, and (*b*) the person or persons who will manage the project. See Attached Sheet #1 & #2
*5. Are you the owner or the lessee of the property? Lessee
6. If owner, state what claims, liens, or encumbrances, if any, are against the property.
7. If lessee, attach a copy of the lease and state if it is in good standing. Attached

NOTE.—It will be necessary to procure and attach to the exploration project contract agreements of claimants, lienors, encumbrances and lessors subordinating their interests in the property to the interest of the Government under the contract.

8. Furnish current financial statement, showing assets and liabilities, and a profit and loss statement. Attached
9. How much money is applicant prepared to invest in proposed project? Is it sufficient to pay your part of the cost of the project as detailed in question 23 of this application form, in accordance with the regulations on Government participation (Section 9 of Mineral Order 5)?

*If you have already answered these questions on MF-100, you are not required to answer the questions for this application.

16—64067-1

## THE PROPERTY

10. (*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 Sheet #2

(*b*) Give the legal description of the exact parcel, plot, or area upon which the exploration is to be conducted. As above

NOTE.—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 (*b*) 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.

*11. State the present and former names of the property, if any. See Sheet #2

*12. State, in detail, the location of the property with reference to towns, railroads, roads, shipping points, including distances and directions and kinds and conditions of roads. See Sheet #2

*13. State source and quantity of water available for operations and its sufficiency at all seasons. See Sheet #3 State amount of power to be used, rate per hour or other cost, and source.

*14. Describe any existing useable facilities, equipment, buildings, or structure now on the property that will be devoted to the exploration work. See Sheet #3

15. State in detail how the ore could be shipped and how and where milled. See Sheet #3

*16. History: See Sheets #3 thru #7 • Maps & pictures attache.

(*a*) Give a statement, as complete as possible, of previous exploration, development, operation, and production of property, with reasons for any past suspensions of operations.

(*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.

*17. Production:

(*a*) If mine is in production, furnish the following information:

| | *Tons per day* | *Grade or analysis* | *Cost per ton* | *Net value per ton* |
|---|---|---|---|---|
| (1) Mining | | | | |
| (2) Milling | | | | |
| (3) Shipped or sold | | | | |

*18. Ore or mineral reserves: (If property is or has been operating.)

(*a*) Describe the ore or mineral deposits briefly.

(*b*) Submit available maps and assay data.

(*c*) Give estimated tonnage and grade of each class of ore reserves.

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

## THE EXPLORATION

20. For what mineral or minerals and for what types of deposits and ores will the exploration be conducted?

21. Describe briefly, but concisely, the proposed work and the estimated time required to complete it.

NOTE.—The Government will not participate in a project that will require more than 2 years to complete.

22. Furnish statement of the geological basis of the project with particular emphasis on factors leading the operator to expect the finding of commercial ore bodies. This statement should be accompanied by supporting maps such as geological maps, maps of the proposed openings and assay maps, sample lists, and other pertinent data.

## THE REQUIREMENTS AND COSTS

23. Tabulate in the form of an itemized statement with a sum for each item the estimated requirements and costs of the project so that the total will give the estimated cost of the project in which the Government will participate, as follows:

(*a*) Labor, by numbers and classes (miners, muckers, millmen, etc.), with wages of each.

(*b*) Supervisors, by numbers and positions, with salaries of each.

(*c*) Cost of necessary repairs to existing facilities, structures, and buildings.

(*d*) Cost of necessary installation or construction of additional facilities, structures, and buildings.

(*e*) Cost of items of equipment, not now owned by the applicant which must be purchased for operations at a cost of $50 or more each.

(*f*) Cost of rental for equipment which the operator proposes to rent.

(*g*) Rental value of items of equipment which the operator now owns and which will be devoted to the work.

(*h*) Cost of materials and supplies, including items of equipment costing less than $50 each.

(*i*) Cost of power, water, utilities, and any other items not provided for above.

24. Furnish a time schedule of the project, stated in terms of months after project is approved, showing progress expected to be accomplished and the money expected to be spent.

## 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.

Whitechuck Inc. (Name of company) By [signature] (Signature of authorized official)

June 13, 1951 (Date) Chairman of the Board (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.**

*Same as footnote on page 1.

16—64067-1 U. S. GOVERNMENT PRINTING OFFICE

Application Sheet #1

Whitechuck Inc.
224 W. 195
Seattle 77, Wash.

2. Officers of corporation:

| | | |
|---|---|---|
| Chairman of the Board | R. C. Robinson | 224 W. 195 Seattle |
| President | R. O. Smith | 6852-27th N.E. Seattle |
| Vice-President | W. E. Hicks | 8025-37th N.E. Seattle |
| Secretary | E. L. Roe | 19522-8th N.W. Seattle |
| Treasurer | Edw. F. Murray | 203 American Bld. Seattle |

Board of Directors:

| | | |
|---|---|---|
| R. C. Robinson | 224 W. 195 | Seattle, Washington |
| R. O. Smith | 6852-27th N. E. | Seattle, Washington |
| H. S. Hovik | French Street. | Arlington, Washington |
| Edw. F. Murray | 203 American Bld. | Seattle, Washington |
| E. K. Radke | Rt. 2, Box 527 | Kirkland, Washington |

5 Largest Stockholders:

| | | |
|---|---|---|
| R. C. Robinson | 224 W. 195 | Seattle, Washington |
| W. L. Radke | Rt. 2, Box 527 | Kirkland, Washington |
| E. K. Radke | Rt. 2, Box 527 | Kirkland, Washington |
| George R. Stuntz | 3203 Conkling Pl. | Seattle, Washington |
| W. E. Hicks | 8025-37th N.E. | Seattle, Washington |

3. Mining and general business experience of:

(a) Applicant - R. C. Robinson

Chief Engineer, Savannah Proving Grounds
General Supt., Continental Portland Cement Plant, St. Lois
General Supt. for Canadian Operations of W.M. Sutherland Co., Ltd., Toronto, Canada
President and in charge of construction, Strandberg and Robinson, Contractors, Seattle
Chief Engineer, W.P.A., State of Washington
Colonel, General Staff Corps, U.S. Army, Australia
President, Unit Co. Inc., Construction and Design, Seattle
Mining Experience:
- Limestone Quarry, St. Louis, Mo.
- Gold Quartz Property, British Columbia
- Lead Silver Property, State of Washington
- Gold Placé, Philippine Islands

(b) Persons Managing Project:

R. C. Robinson - As above
Edw. F. Murray - C.P.A.

Application Sheet #2

Whitechuck Inc.
224 W. 195
Seattle 77, Wash.

4. (b) Con'td.

Ralph O. Smith - Mining Engineer
Limestone Quarry, State of Washington
Gold Mining, Oregon
Quicksilver, Alaska
Pumice & Iron, State of Washington
General Experience:
U.S. Treasury Dept.

7. Copy of leases are attached and are in good standing. The named lessee is Unit Co., Inc. which was former name of present company, Whitechuck Inc. The change of name was made July, 1949.

10. (a) and (b) are the same, as follows:

Situated in the Snohomish County Mining District

Sauk #1, N½ of the N½, Sec. 24, T31N, R10EWM
Sauk #2, S½ of S½ of Sec. 13, T31N, R10EWM
Sauk #3, N½ of S½ of Sec. 13, T31N, R10EWM
Sauk #4, NW¼ of SW¼ of Sec. 18, T31N, R11EWM
SW¼ of SW¼ of Sec. 18, T31N, R11EWM
NW¼ of NW¼ of Sec. 19, T31N, R11EWM
Sauk #5, E½ of NW¼ of Sec. 19, T31N, R11EWM
SW¼ of NW¼ of Sec. 19, T31N, R11EWM
SE¼ of NE¼ of Sec. 24, T31N, R10EWM
Sauk #6, S½ of NW¼ of Sec. 18, T31N, R11EWM
E½ of SW¼ of Sec. 18, T31N, R11EWM
Sauk #7, S½ of NW¼ of NE¼ of Sec. 13, T31N, R10EWM
N½ of SW¼ of NE¼ of Sec. 13, T31N, R10EWM
S½ of SE¼ of NW¼ of Sec. 13, T31N, R10EWM
NE¼ of SE¼ of NW¼ of Sec. 13, T31N, R10EWM

11. Present names of property are:

Sauk #1, #2, #3, #4, #5, #6, and #7.

12. This property lies between the Sauk and Whitechuck rivers, East and Southeast of their confluence, in Snohomish County, Washington. The nearest town is Darrington, which is ten miles, by gravel road in very good condition, West of the deposit. The Northern Pacific Railway connects with Darrington.

Application Sheet #3
Whitechuck Inc.
224 W. 195

13. Water available from Whitechuck & Sauk Rivers, 100 second feet minimum.

Power from gas or diesel to operate plant.

14. One four man bunk house
1 crusher and rolls
1 75 HP diesel

15. After concentrating on property, can be trucked to tidewater at Everett or shipped by rail at Darrington. No milling required. Pellatizing can be done at Darrington or Everett if desirable.

16. History:

(a) This deposit represents a roughly triangular area of flat benchland showing a depth from one hundred three feet on the north to about one hundred fifty feet on the south. Over two hundred holes have been excavated on the flat benchland to a depth of from ten to twenty feet. Both the north and south exposures are steep banks, the south exposure has several short valleys cut back in the bench land from one hundred to three hundred feet. These exposures have been sampled as well as each hole excavated on the benchland. The amount of magnetic iron and pumice was found to average in these tests as follows: magnetic iron, 15% by weight, of the sand content and the pumice, 40% of the whole volume.

The overburden consists of about 6 inches to 18 inches of silty soil mixed with pumice of 1/4 inch to 1 inch diameter, the pea size pumice representing about 1/3 of the overburden by volume.

Second growth fir, cedar, and hemlock with some underbrush cover the entire area which was logged about 20 years ago. The stumps of logging remain, averaging some 30 to the acre.

The pumice in the deposit consists generally of about 40% in volume of 1/4 inch plus material of commercially useable light weight aggregate. Due to a small percentage of scoriacious material the weight is a little heavier than wind blown pumice ranging under 10% heavier, however, by actual weight. Crushing strength is considerably greater with this type of aggregate.

Screen analysis shows this 40% plus 1/4 inch material to run approximately 53% 1/8 inch to 3/8 inch, 24% 3/8 inch plus to 1 inch, and 23% 1 inch plus, by volume.

Whitechuck Inc.
224 W. 195
Seattle 77, Wash.

16. History - Cont'd

(a) Based upon the exposures now existing and the holes excavated, there are about five hundred acres with an average depth of fifty feet and the following quantities are believed to be a fair estimate - 13,200,000 cubic yards of pumice, and since the sand weighs two tons to a cubic yard, there are 5,940,000 tons of magnetic iron.

The property was operated for production of pumice only. Lack of capital caused operations to cease.

The magnetite or "blacksand" is a concentration deposit in pumice, scoria, and a silica feldspar sand deposited in an old glacial lakebed by the Whitechuck River. The pumice and scoria originating from Glacier Peak volcanic action and the sands from disintegration of various igneous rocks cut by the Whitechuck River.

The magnetite occurs with the silica and feldspar sand and generally is consistent throughout the deposit from top to bottom. There are many exposures on the sides of the deposit showing the full depth. These faces have been thoroughly sampled along with some two hundred test holes.

(b) No adjoining properties.

(c) Mineralogically the magnetite is relatively pure, phosphorus percentage being 0.02%, sulphur negligible 0.003%, and titanium 5.10%. Iron content 72% plus.

The recovery of the magnetite is simple at this site. Actually it is a by-product of the pumice that was produced.

Laboratory tests of Whitechuck sand gave the following results:

"Following are the results of sieve analyses and magnetite analyses:

Sieve Analysis: (Total Sand)

| Size | Percentage of Total Sample | |
|---|---|---|
| Larger than #28 screen | 6.77 | by weights |
| #28 to #48 screen | 27.51 | " |
| #48 to #100 screen | 47.31 | " |
| Smaller than #100 screen | 18.41 | " |

Whitechuck Inc.
224 W. 195
Seattle 77, Wash.

16. History - Cont'd

(c) Cont'd

Magnetite Determination:

| Size | Percentage of Size Fraction as Magnetite | |
|---|---|---|
| Larger than #28 | 33.9 | by weights |
| #28 to #48 | 24.4 | " |
| #48 to #100 | 41.0 | " |
| Smaller than #100 | 47.2 | " |

"The magnetite determination was made by a magnetic separation method, the magnetite being obtained at an estimated purity of 80%. The percentage of the total sample as magnetite of this purity is therefore 37.1. Approximately 50% of the magnetite is in the #48 to #100 size fraction. Half of the remaining magnetite is in the size fraction smaller than #100 screen."

A second laboratory test of Whitechuck sand gave the following results:

Sieve Analysis: (Total Sand)

| Size | % of Total Sample |
|---|---|
| Larger than #30 screen | 23.3 |
| #30 - #50 | 34.0 |
| #50 - #100 | 30.6 |
| Smaller than #100 | 12.1 |

Magnetite Analysis

| Size | % of Size Fraction Separable by Magnet |
|---|---|
| Larger than #30 screen | 31.3 |
| #30 - #50 | 15.8 |
| #50 - #100 | 22.1 |
| Smaller than #100 | 29.6 |

"The two larger size ffractions are estimated to be approximately 50% pure magnetite. The #50 - #100 and the minus #100 fractions are estimated to be 85% - 90% pure magnetite."

Whitechuck Inc.
224 W. 195
Seattle 77, Wash.

16. History - Cont'd

(c) Cont'd

Utilizing the above results one may calculate that of the total unseparable sample, 23% is appreciably magnetic.

A sieve test of completely separated magnetic iron, for fineness, gave the following result:

| | Weights | % |
|---|---|---|
| Retained on 14 mesh . . . . | Trace | Trace |
| " " 28 " . . . . | 1/4 oz. | 0.7 |
| " " 48 " . . . . | 2-0 | 5.9 |
| " " 100 " . . . . | 19-3/4 | 58.1 |
| Pan . . . . . | 12-0 | 35.3 |
| Total . . . . . | 34 oz. | 100 |

A quantitive spectrographic test and fire assay of the magnetite gave the following results:

| | Estimated Quantities |
|---|---|
| Silica ($SiO_2$) . . . . . | 12% to 14% |
| Magnesium (MgO) . . . . . | 0.8% |
| Iron ($Fe_2O_4$) . . . . . | 80% to 90% |
| Calcium (CaO) . . . . . | 0.6% |

Trace quantities of the following:

| | | | |
|---|---|---|---|
| Aluminum (Al) | Sodium (Na) | Cobalt (Co) | Potassium (K) |
| Lead (Pb) | Zinc (Zn) | Titanium (Ti) | Strontium (Sr) |
| Copper (Cu) | Nickel (Ni) | Manganese (Mn) | Chromium (Cr) |

| | | Value per Ton |
|---|---|---|
| Gold, Oz. Troy per Ton . . . | Trace | . . . |
| Silver, Oz. Troy per Ton . . | Trace | . . . |

A chemical analysis of the magnetite gave the following result:

| | |
|---|---|
| Sulfur as Sulfide . . . . . | 0.003 |
| Sulfur as Sulfuric Anhydride . . . . . | 0.23 |
| Phosphorus, P . . . . . | 0.02 |
| Titanium, Ti . . . . . | 5.10 |
| Gold . . . . . | 0.01 |

Whitechuck Inc.
224 W. 195
Seattle 77, Wash.

16. History - Cont'd

(c) Cont'd

A reduction test of the magnetite was made at the University of Washington. A small pig was produced using an oil furnace and another pig was produced in a PCE furnace using propane gas. The iron was high grade and it was determined to reduce a larger sample of the magnetite in an electric furnace.

reement, made the 4th day of October, 1947 by and
ARD F. SMITH, JEAN SMITH, of Arlington, Washington, W. L. RADKE,
ON, W. A. HICKS, E. EVANS, H. H. ROBINSON, B. K. RADKE, all of
hington, herein after called lessors, and the Unit Co., Inc.,
n, herein after called lessee.

Witnesseth, that the lessors for and in consideration of ten dollars to them in hand paid, receipt of which is hereby acknowledged, and for the further consideration of the covenants and agreements hereinafter set out, do by these presents demise let and lease unto the lessee and it's assigns the following described unpantented placer mining claims of which lessors are the locators and claimants, said mining claims being more particularly described as follows:

a. Sauk #1, being the
N½ of N½ Sec. 24, T31N, R10EWM

b. Sauk #2, being the
S½ of S½ Sec. 13, T31N, R10EWM

c. Sauk #3, being the
N½ of S½ Sec. 13, T31N, R10EWM

d. Sauk #4, being the
NW¼ of NW¼ Sec. 19, T31N, R11EWM, and
SW¼ of SW¼ Sec. 18, T31N, R11EWM, and
NW¼ of SW¼ Sec. 18, T31N, R11EWM

all of said claims being situated in Snohomish County, State of Washington.

This lease shall remain in effect for a period of ten (10) years from the date hereof, provided, however, that lessee may renew said lease for a further period of ten (10) years by notifying lessors in writing of its desire to do so at any time during the last six months of the ten year period.

By virtue of these presents lessee shall be entitled to exclusive possession of the claims described herein and shall be entitled to mine, remove, and sell the clays, rocks, sands and minerals, and particularly the pumice stone and pumice sand found thereon, and shall further be entitled to carry on all operations thereon connected with or desirable in the mining and removal of said materials and shall have the right to use the timber found on said claims for all of said purposes.

The lessee agrees to pay the lessors a royalty of eight (8) cents per cubic yard for every cubic yard of merchantable material or mineral mined and removed from said land, and a settlement for royalty shall be

made on or before the 15th of each month for such minerals and materials loaded on railroad cars or trucks and shipped during said calendar month next preceeding.

The lessee agrees to keep a complete record of the entire output of the mine or mines that he may operate on said land and said record shall be open to the lessors for insepction at all reasonable times.

The lessee agrees to carry on the work of mining in accordance with customary methods, unless an unavoidable cause prevents.

Lessee's right to mining operations on above described property shall be exclusive and all the covenants, agreements and conditions shall be binding and endure to the heirs and assigns of lessors and lessee.

Lessee may terminate this lease at any time the mine, ceases to be profitable to operate, of which the lessee shall be judge, by giving the lessor thirty days' notice of his intention so to do and upon the expiration of said thirty days shall have the right and privilege to remove all the buildings, machinery and improvements now situated or hereafter erected, upon the real estate hereby described, provided all royalties due and owing to the lessor shall have been paid.

/s/ Millard F. Smith
MILLARD F. SMITH

/s/ Jean Smith
JEAN SMITH

/s/ W. L. Radke
W. L. RADKE

/s/ R. C. Robinson
R. C. ROBINSON

/s/ W. E. Hicks
W. E. HICKS

/s/ E. Evans
E. EVANS

/s/ H. H. Robinson
H. H. ROBINSON

/s/ E. K. Radke
E. K. RADKE

UNIT COMPANY INC.,

BY /s/ R. C. Robinson
R. C. Robinson, President

/s/ W. L. Radke
W. L. Radke, Secretary

This agreement, made 14th day of March 1948 by and between MILLARD F. SMITH, JEAN SMITH, of Arlington, Washington, W.L. RADKE, R. C. ROBINSON, W. E. HICKS, E. EVANS, H.H. ROBINSON, E.K.RADKE, all of Seattle, Washington, herein after called lessors, and the Unit Co., Inc., a corporation, herein after called lessee.

Witnesseth, that the lessors for and in consideration of ten dollars to them in hand paid, receipt of which is hereby acknowledged, and for the further consideration of the covenants and agreements hereinafter set out, do by these presents demise let and lease unto the lessee and it's assigns the following described unpatented placer mining claims of which lessors are the locators and claimants, said mining claims being more particularly described as follows:

a. Sauk #5 being the
E½ of NW¼ of Sec. 19, T31N, R11EWM
SW¼ of NW¼ of Sec. 19, T31N, R11EWM
SE¼ of NE¼ of Sec. 24, T31N, R10EWM

b. Sauk #6 being the
S½ of NW¼ of Sec. 18, T31N, R11EWM
E½ of SW¼ of Sec. 18, T31N, R11EWM

All of said claims being situated in Snohomish County, State of Washington.

This lease shall remain in effect for a period of ten (10) years from the date hereof, provided, however, that lessee may renew said lease for a further period of ten (10) years by notifying lessors in writing of its desire to do so at any time during the last six months of the ten year period.

By virtue of these presents lessee shall be entitled to exclusive possession of the claims described herein and shall be entitled to mine, remove, and sell the clays, rocks, sands and minerals, and particularly the pumice stone and pumice sand found thereon, and shall further be entitled to carry on all operations thereon connected with or desirable in the mining and removal of said materials and shall have the right to use the timber found on said claims for all of said purposes.

The lessee agrees to pay the lessors a royalty of eight (8) cents per cubic yard for every cubic yard of merchantable material or mineral mined and removed from said land, and a settlement for royalty shall be made on or before the 15th of each month for such minerals and materials loaded on railroad cars or trucks and shipped during said calendar month next preceeding.

ssee agrees to keep a complete record of the entire output of r mines that he may operate on said land and said record shall be the lessors for inspection at all reasonable times.

e lessee agrees to carry on the work of mining in accordance with customary methods, unless an unavoidable cause prevents.

Lessee's right to mining operations on above described property shall be exclusive and all the covenents, agreements and conditions shall be binding and endure to the heirs and assigns of lessors and lessee.

Lessee may terminate this lease at any time the mine, ceases to be profitable to operate, of which the lessee shall be judge, by giving the lessor thirty days' notice of his intention so to do and upon the expiration of said thirty days shall have the right and privilege to remove all the buildings, machinery and improvements now situated or hereafter erected upon the real estate hereby described, provided all royalties due and owing to the lessor shall have been paid.

/s/ Millard F. Smith
MILLARD F. SMITH

/s/ Jean Smith
JEAN SMITH

/s/ W. L. Radke
W. L. RADKE

/s/ R. C. Robinson
R. C. ROBINSON

/s/ W. E. Hicks
W. E. HICKS

/s/ E. Evans
E. EVANS

/s/ H. H. Robinson
H. H. ROBINSON

/s/ E. K. Radke
E. K. RADKE

UNIT CO. INC.,

BY: /s/ R. C. Robinson
R. C. Robinson, President

/s/ W. L. Radke
W. L. Radke, Secretary

WHITECHUCK, INC.

BALANCE SHEET

December 31, 1950

## ASSETS

| | | | | |
|---|---|---|---|---|
| **CASH** | | | | |
| On Deposit | | | | $ 145.64 |
| **CAPITAL ASSETS** | | | | |
| Depreciable Assets | | $ 14,556.53 | | |
| Less: Reserve for Depreciation | | 3,395.24 | $ 11,161.29 | |
| Depletable Assets-Mining Development | | | 20,499.89 | 31,661.18 |
| **OTHER ASSETS** | | | | |
| Organization Expense | | | 84.60 | |
| Building Plans | | | 988.63 | |
| Miscellaneous Account Receivable | | | 135.70 | 1,208.93 |
| Total | | | | $ 33,015.75 |

## LIABILITIES

| | | | | |
|---|---|---|---|---|
| **ACCOUNTS PAYABLE** | | | | $ 4,175.33 |
| **NOTE PAYABLE** | | | | 3,348.50 |
| **ACCRUED INTEREST PAYABLE** | | | | 1,159.94 |
| **CAPITAL STOCK** | | | | |
| Common Stock, $10.00 par value, issued and outstanding | | | $ 12,390.00 | |
| **SURPLUS** | | | | |
| Paid in Surplus | | $ 19,260.00 | | |
| Earned Surplus- | | | | |
| (Deficit) Dec. 31, 1949 | (1,077.33) | | | |
| Loss for year ended Dec. 31, 1950 | 6,240.69 | (7,318.02 ) | 11,941.98 | 24,331.98 |
| Total | | | | $ 33,015.75 |

WHITECHUCK, INC.

STATEMENT OF PROFIT AND LOSS

YEAR ENDED DEC. 31, 1950

| | | |
|---|---|---|
| REVENUE | | $ None |
| EXPENSES | | |
| Bank charges | $ .70 | |
| Insurance | 123.02 | |
| Accounting | 100.00 | |
| Legal expense | 42.98 | |
| Miscellaneous | 45.62 | |
| Postage | 6.57 | |
| Travel expense | 3.44 | |
| Telephone and Telegraph | 2.52 | |
| Maintenance and Repairs | 244.59 | |
| Taxes | 163.34 | |
| Tax Penalties | 77.52 | |
| Depreciation | 1,724.02 | |
| OTHER DEDUCTIONS | | |
| Interest | 241.34 | |
| Losses by theft | 320.20 | |
| Loss on Sale of Land | 3,144.83 | $ 6,240.69 |
| Loss for year 1950 | | ( $ 6,240.69 ) |

[illegible]-103
([illegible] 1951)

U[illegible]. DEPARTMENT OF THE INTER[illegible]R

DEFENSE MINERALS ADMINISTRATION

Budget Bureau No. 42-R1035.
Approval expires 6-30-51.

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

DO NOT FILL IN THIS BLOCK

Docket No. DMA 1733 X

Date received 6-25-51

Participation

Whitechuck Incorporated
224 West 195
Seattle 77, Washington

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
JUN 25 1951
LOUIS A. SCHOEL
Executive Secretary

Name and address of applicant

Date June 13, 1951

FILL IN THIS BLOCK

Date of application

Estimated cost

Mineral or metal Magnetite Iron

Percentage of Government participation

Location of mine Confluence of Whitechuck &
Sauk Rivers, Snohomish Co., Washington

Date of filing MF-100

DMA Docket Number, if available

## INSTRUCTIONS

Read Mineral Order 5, Regulations Governing Government Aid in Defense Projects, before completing this application. Submit four signed copies of the application to Defense Minerals Administration, Department of the Interior, Washington 25, D. C., or to the nearest field executive officer thereof, with your name and address on each sheet of the application and all accompanying papers. If any question is inapplicable, or if you cannot answer it, so state on the form. Where the space provided for answer is insufficient, answer on a separate sheet, annex it to the application form, and refer to it in space for answer. If the application is approved, you will be presented with an exploration project contract on Form MF-200, for your signature.

## THE APPLICANT

*1. Is applicant an individual, partnership, or corporation? Corporation

*2. If a partnership, state names and addresses of partners. See Attached Sheet (See Attached

*3. If a corporation, state names and addresses of officers, directors, and five largest stockholders. (Sheet #1

*4. Describe the mining and general business experience of (*a*) the applicant, and (*b*) the person or persons who will manage the project. See Attached Sheet #1 & #2

*5. Are you the owner or the lessee of the property? Lessee

6. If owner, state what claims, liens, or encumbrances, if any, are against the property.

7. If lessee, attach a copy of the lease and state if it is in good standing. Attached

NOTE.—It will be necessary to procure and attach to the exploration project contract agreements of claimants, lienors, encumbrances and lessors subordinating their interests in the property to the interest of the Government under the contract.

8. Furnish current financial statement, showing assets and liabilities, and a profit and loss statement. Attached

9. How much money is applicant prepared to invest in proposed project? Is it sufficient to pay your part of the cost of the project as detailed in question 23 of this application form, in accordance with the regulations on Government participation (Section 9 of Mineral Order 5)?

*If you have already answered these questions on MF-100, you are not required to answer the questions for this application.

16—64067-1

## THE PROPERTY

10. (*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 Sheet #2

(*b*) Give the legal description of the exact parcel, plot, or area upon which the exploration is to be conducted. As above

NOTE.—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 (*b*) 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.

*11. State the present and former names of the property, if any. See Sheet #2

*12. State, in detail, the location of the property with reference to towns, railroads, roads, shipping points, including distances and directions and kinds and conditions of roads. See Sheet #2

*13. State source and quantity of water available for operations and its sufficiency at all seasons. See Sheet #3
State amount of power to be used, rate per hour or other cost, and source.

*14. Describe any existing useable facilities, equipment, buildings, or structure now on the property that will be devoted to the exploration work. See Sheet #3

15. State in detail how the ore could be shipped and how and where milled. See Sheet #2

*16. History: See Sheets #3 thru #7. Maps & pictures attache.

(*a*) Give a statement, as complete as possible, of previous exploration, development, operation, and production of property, with reasons for any past suspensions of operations.

(*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.

*17. Production:

(*a*) If mine is in production, furnish the following information:

| | *Tons per day* | *Grade or analysis* | *Cost per ton* | *Net value per ton* |
|---|---|---|---|---|
| (1) Mining | | | | |
| (2) Milling | | | | |
| (3) Shipped or sold | | | | |

*18. Ore or mineral reserves: (If property is or has been operating.)

(*a*) Describe the ore or mineral deposits briefly.

(*b*) Submit available maps and assay data.

(*c*) Give estimated tonnage and grade of each class of ore reserves.

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

## THE EXPLORATION

20. For what mineral or minerals and for what types of deposits and ores will the exploration be conducted?

21. Describe briefly, but concisely, the proposed work and the estimated time required to complete it.

NOTE.—The Government will not participate in a project that will require more than 2 years to complete.

22. Furnish statement of the geological basis of the project with particular emphasis on factors leading the operator to expect the finding of commercial ore bodies. This statement should be accompanied by supporting maps such as geological maps, maps of the proposed openings and assay maps, sample lists, and other pertinent data.

## THE REQUIREMENTS AND COSTS

23. Tabulate in the form of an itemized statement with a sum for each item the estimated requirements and costs of the project so that the total will give the estimated cost of the project in which the Government will participate, as follows:

(*a*) Labor, by numbers and classes (miners, muckers, millmen, etc.), with wages of each.

(*b*) Supervisors, by numbers and positions, with salaries of each.

(*c*) Cost of necessary repairs to existing facilities, structures, and buildings.

(*d*) Cost of necessary installation or construction of additional facilities, structures, and buildings.

(*e*) Cost of items of equipment, not now owned by the applicant which must be purchased for operations at a cost of $50 or more each.

(*f*) Cost of rental for equipment which the operator proposes to rent.

(*g*) Rental value of items of equipment which the operator now owns and which will be devoted to the work.

(*h*) Cost of materials and supplies, including items of equipment costing less than $50 each.

(*i*) Cost of power, water, utilities, and any other items not provided for above.

24. Furnish a time schedule of the project, stated in terms of months after project is approved, showing progress expected to be accomplished and the money expected to be spent.

## 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.

Whitechuck Inc. (Name of company) By R. A. Robinson (Signature of authorized official)

June 13, 1951 (Date) Chairman of the Board (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.**

*Same as footnote on page 1.

16—64067-1 U. S. GOVERNMENT PRINTING OFFICE

Application Sheet #1

Whitechuck Inc.
224 W. 195
Seattle 77, Wash.

2. Officers of corporation:

| | | |
|---|---|---|
| Chairman of the Board | R. C. Robinson | 224 W. 195 Seattle |
| President | R. O. Smith | 6852-27th N.E. Seattle |
| Vice-President | W. E. Hicks | 8025-37th N.E. Seattle |
| Secretary | E. L. Roe | 19522-8th N.W. Seattle |
| Treasurer | Edw. F. Murray | 203 American Bld. Seattle |

Board of Directors;

| | | |
|---|---|---|
| R. C. Robinson | 224 W. 195 | Seattle, Washington |
| R. O. Smith | 6852-27th N. E. | Seattle, Washington |
| H. S. Hovik | French Street | Arlington, Washington |
| Edw. F. Murray | 203 American Bld. | Seattle, Washington |
| E. K. Radke | Rt. 2, Box 527 | Kirkland, Washington |

5 Largest Stockholders:

| | | |
|---|---|---|
| R. C. Robinson | 224 W. 195 | Seattle, Washington |
| W. L. Radke | Rt. 2, Box 527 | Kirkland, Washington |
| E. K. Radke | Rt. 2, Box 527 | Kirkland, Washington |
| George R. Stuntz | 3203 Conkling Pl. | Seattle, Washington |
| W. E. Hicks | 8025-37th N.E. | Seattle, Washington |

3. Mining and general business experience of:

(a) Applicant - R. C. Robinson

Chief Engineer, Savannah Proving Grounds
General Supt., Continental Portland Cement Plant, St. Louis
General Supt. for Canadian Operations of R.M. Sutherland Co., Ltd., Toronto, Canada
President and in charge of construction, Strandberg and Robinson, Contractors, Seattle
Chief Engineer, W.P.A., State of Washington
Colonel, General Staff Corps, U.S. Army, Australia
President, Unit Co. Inc., Construction and Design, Seattle
Mining Experience:
- Limestone Quarry, St. Louis, Mo.
- Gold Quartz Property, British Columbia
- Lead Silver Property, State of Washington
- Gold Place, Philippine Islands

(b) Persons Managing Project:

R. C. Robinson - As above
Edw. F. Murray - C.P.A.

Whitechuck Inc.
224 W. 195
Seattle 77, Wash.

4. (b) Con'td.

Ralph O. Smith - Mining Engineer
Limestone Quarry, State of Washington
Gold Mining, Oregon
Quicksilver, Alaska
Pumice & Iron, State of Washington
General Experience:
U.S. Treasury Dept.

7. Copy of leases are attached and are in good standing. The named lessee is Unit Co., Inc. which was former name of present company, Whitechuck Inc. The change of name was made July, 1949.

10. (a) and (b) are the same, as follows:

Situated in the Snohomish County Mining District

Sauk #1, N½ of the N½, Sec. 24, T31N, R10EWM
Sauk #2, S½ of S½ of Sec. 13, T31N, R10EWM
Sauk #3, N½ of S½ of Sec. 13, T31N, R10EWM
Sauk #4, NW¼ of SW¼ of Sec. 18, T31N, R11EWM
SW¼ of SW¼ of Sec. 18, T31N, R11EWM
NW¼ of NW¼ of Sec. 19, T31N, R11EWM
Sauk #5, E½ of NW¼ of Sec. 19, T31N, R11EWM
SW¼ of NW¼ of Sec. 19, T31N, R11EWM
SE¼ of NE¼ of Sec. 24, T31N, R10EWM
Sauk #6, S½ of NW¼ of Sec. 18, T31N, R11EWM
E½ of SW¼ of Sec. 18, T31N, R11EWM
Sauk #7, S½ of NW¼ of NE¼ of Sec. 13, T31N, R10EWM
N½ of SW¼ of NE¼ of Sec. 13, T31N, R10EWM
S½ of SE¼ of NW¼ of Sec. 13, T31N, R10EWM
NE¼ of SE¼ of NW¼ of Sec. 13, T31N, R10EWM

11. Present names of property are:

Sauk #1, #2, #3, #4, #5, #6, and #7.

12. This property lies between the Sauk and Whitechuck rivers, East and Southeast of their confluence, in Snohomish County, Washington. The nearest town is Darrington, which is ten miles, by gravel road in very good condition, West of the deposit. The Northern Pacific Railway connects with Darrington.

Application
Whitechuck Inc.
224 W. 195

Sheet #3

13. Water available from Whitechuck & Sauk Rivers, 100 second feet minimum.

Power from gas or diesel to operate plant.

14. One four man bunk house
1 crusher and rolls
1 75 HP diesel

15. After concentrating on property, can be trucked to tidewater at Everett or shipped by rail at Darrington. No milling required. Pellatizing can be done at Darrington or Everett if desirable.

16. History:

(a) This deposit represents a roughly triangular area of flat benchland showing a depth from one hundred three feet on the north to about one hundred fifty feet on the south. Over two hundred holes have been excavated on the flat benchland to a depth of from ten to twenty feet. Both the north and south exposures are steep banks, the south exposure has several short valleys cut back in the bench land from one hundred to three hundred feet. These exposures have been sampled as well as each hole execavated on the benchland. The amount of magnetic iron and pumice was found to average in these tests as follows: magnetic iron, 15% by weight, of the sand content and the pumice, 40% of the whole volume.

The overburden consists of about 6 inches to 18 inches of silty soil mixed with pumice of 1/4 inch to 1 inch diameter, the pea size pumice representing about 1/3 of the overburden by volume.

Second growth fir, cedar, and hemlock with some underbrush cover the entire area which was logged about 20 years ago. The stumps of logging remain, averaging some 30 to the acre.

The pumice in the deposit consists generally of about 40% in volume of 1/4 inch plus material of commercially useable light weight aggregate. Due to a small percentage of scoriacious material the weight is a little heavier than wind blown pumice ranging under 10% heavier, however, by actual weight. Crushing strength is considerably greater with this type of aggregate.

Screen analysis shows this 40% plus 1/4 inch material to run approximately 53% 1/8 inch to 3/8 inch, 24% 3/8 inch plus to 1 inch, and 23% 1 inch plus, by volume.

Whitechuck Inc.
224 W. 195
Seattle 77, Wash.

16. History - Cont'd

(a) Based upon the exposures now existing and the holes excavated, there are about five hundred acres with an average depth of fifty feet and the following quantities are believed to be a fair estimate - 13,200,000 cubic yards of pumice, and since the sand weighs two tons to a cubic yard, there are 5,940,000 tons of magnetic iron.

The property was operated for production of pumice only. Lack of capital caused operations to cease.

The magnetite or "blacksand" is a concentration deposit in pumice, scoria, and a silica feldspar sand deposited in an old glacial lakebed by the Whitechuck River. The pumice and scoria originating from Glacier Peak volcanic action and the sands from disintegration of various igneous rocks cut by the Whitechuck River.

The magnetite occurs with the silica and feldspar sand and generally is consistent throughout the deposit from top to bottom. There are many exposures on the sides of the deposit showing the full depth. These faces have been thoroughly sampled along with some two hundred test holes.

(b) No adjoining properties.

(c) Mineralogically the magnetite is relatively pure, phosphorus percentage being 0.02%, sulphur negligible 0.003%, and titanium 5.10%. Iron content 72% plus.

The recovery of the magnetite is simple at this site. Actually it is a by-product of the pumice that was produced.

Laboratory tests of Whitechuck sand gave the following results:

"Following are the results of sieve analyses and magnetite analyses:

Sieve Analysis: (Total Sand)

| Size | Percentage of Total Sample | |
|---|---|---|
| Larger than #28 screen | 6.77 | by weights |
| #28 to #48 screen | 27.51 | " |
| #48 to #100 screen | 47.31 | " |
| Smaller than #100 screen | 18.41 | " |

Whitechuck Inc.
224 W. 195
Seattle 77, Wash.

16. History - Cont'd

(c) Cont'd

Magnetite Determination:

| Size | Percentage of Size Fraction as Magnetite | |
|---|---|---|
| Larger than #28 | 33.9 | by weights |
| #28 to #48 | 24.4 | " |
| #48 to #100 | 41.0 | " |
| Smaller than #100 | 47.2 | " |

"The magnetite determination was made by a magnetic separation method, the magnetite being obtained at an estimated purity of 80%. The percentage of the total sample as magnetite of this purity is therefore 37.1. Approximately 50% of the magnetite is in the #48 to #100 size fraction. Half of the remaining magnetite is in the size fraction smaller than #100 screen."

A second laboratory test of Whitechuck sand gave the following results:

Sieve Analysis: (Total Sand)

| Size | % of Total Sample |
|---|---|
| Larger than #30 screen | 23.3 |
| #30 - #50 | 34.0 |
| #50 - #100 | 30.6 |
| Smaller than #100 | 12.1 |

Magnetite Analysis

| Size | % of Size Fraction Separable by Magnet |
|---|---|
| Larger than #30 screen | 31.3 |
| #30 - #50 | 15.8 |
| #50 - #100 | 22.1 |
| Smaller than #100 | 29.6 |

"The two larger size fractions are estimated to be approximately 50% pure magnetite. The #50 - #100 and the minus #100 fractions are estimated to be 85% - 90% pure magnetite."

Whitechuck Inc.
224 W. 195
Seattle 77, Wash.

16. History - Cont'd

(c) Cont'd

Utilizing the above results one may calculate that of the total unseparable sample, 23% is appreciably magnetic.

A sieve test of completely separated magnetic iron, for fineness, gave the following result:

| | Weights | % |
|---|---|---|
| Retained on #14 mesh . . . . | Trace | Trace |
| " " #28 " . . . . . | 1/4 oz. | 0.7 |
| " " #48 " . . . . . | 2-0 | 5.9 |
| " " #100 " . . . . . | 19-3/4 | 58.1 |
| Pan . . . . . | 12-0 | 35.3 |
| Total . . . . . | 34 oz. | 100 |

A quantitive spectrographic test and fire assay of the magnetite gave the following results:

| | Estimated Quantities |
|---|---|
| Silica ($SiO_2$) . . . . . | 12% to 14% |
| Magnesium (MgO) . . . . . | 0.8% |
| Iron ($Fe_2O_4$) . . . . . | 80% to 90% |
| Calcium (CaO) . . . . . | 0.6% |

Trace quantities of the following:

| | | | |
|---|---|---|---|
| Aluminum (Al) | Sodium (Na) | Cobalt (Co) | Potassium (K) |
| Lead (Pb) | Zinc (Zn) | Titanium (Ti) | Strontium (Sr) |
| Copper (Cu) | Nickel (Ni) | Manganese (Mn) | Chromium (Cr) |

| | | Value per Ton |
|---|---|---|
| Gold, Oz. Troy per Ton . . . | Trace | . . . |
| Silver, Oz. Troy per Ton . . | Trace | . . . |

A chemical analysis of the magnetite gave the following result:

| | |
|---|---|
| Sulfur as Sulfide . . . . . | 0.003 |
| Sulfur as Sulfuric Anhydride . . . . . | 0.23 |
| Phosphorus, P . . . . . | 0.02 |
| Titanium, Ti . . . . . | 5.10 |
| Gold . . . . . | 0.01 |

Whitechuck Inc.
224 W. 195
Seattle 77, Wash.

16. History - Cont'd

(c) Cont'd

A reduction test of the magnetite was made at the University of Washington. A small pig was produced using an oil furnace and another pig was produced in a PCE furnace using propane gas. The iron was high grade and it was determined to reduce a larger sample of the magnetite in an electric furnace.

This agreement, made the 4th day of October, 1947 by and between MILLARD F. SMITH, JEAN SMITH, of Arlington, Washington, W. L. RA[illegible], R. C. ROBINSON, W. E. HICKS, E. EVANS, H. H. ROBINSON, E. K. RADKE, all of Seattle, Washington, herein after called lessors, and the Unit Co., Inc., a corporation, herein after called lessee.

Witnesseth, that the lessors for and in consideration of ten dollars to them in hand paid, receipt of which is hereby acknowledged, and for the further consideration of the covenants and agreements hereinafter set out, do by these presents demise let and lease unto the lessee and it's assigns the following described unpantented placer mining claims of which lessors are the locators and claimants, said mining claims being more particularly described as follows:

a. Sauk #1, being the
N½ of N½ Sec. 24, T31N, R10EWM

b. Sauk #2, being the
S½ of S½ Sec. 13, T31N, R10EWM

c. Sauk #3, being the
N½ of S½ Sec. 13, T31N, R10EWM

d. Sauk #4, being the
NW¼ of NW¼ Sec. 19, T31N, R11EWM, and
SW¼ of SW¼ Sec. 18, T31N, R11EWM, and
NW¼ of SW¼ Sec. 18, T31N, R11EWM

all of said claims being situated in Snohomish County, State of Washington.

This lease shall remain in effect for a period of ten (10) years from the date hereof, provided, however, that lessee may renew said lease for a further period of ten (10) years by notifying lessors in writing of its desire to do so at any time during the last six months of the ten year period.

By virtue of these presents lessee shall be entitled to exclusive possession of the claims described herein and shall be entitled to mine, remove, and sell the clays, rocks, sands and minerals, and particularly the pumice stone and pumice sand found thereon, and shall further be entitled to carry on all operations thereon connected with or desirable in the mining and removal of said materials and shall have the right to use the timber found on said claims for all of said purposes.

The lessee agrees to pay the lessors a royalty of eight (8) cents per cubic yard for every cubic yard of merchantable material or mineral mined and removed from said land, and a settlement for royalty shall be

made on or before the 15th of each month for such minerals and materials loaded on railroad cars or trucks and shipped during said calendar month next preceeding.

The lessee agrees to keep a complete record of the entire output of the mine or mines that he may operate on said land and said record shall be open to the lessors for insepction at all reasonable times.

The lessee agrees to carry on the work of mining in accordance with customary methods, unless an unavoidable cause prevents.

Lessee's right to mining operations on above described property shall be exclusive and all the covenants, agreements and conditions shall be binding and endure to the heirs and assigns of lessors and lessee.

Lessee may terminate this lease at any time the mine, ceases to be profitable to operate, of which the lessee shall be judge, by giving the lessor thirty days' notice of his intention so to do and upon the expiration of said thirty days shall have the right and privilege to remove all the buildings, machinery and improvements now situated or hereafter erected, upon the real estate hereby described, provided all royalties due and owing to the lessor shall have been paid.

/s/ Millard F. Smith
MILLARD F. SMITH

/s/ Jean Smith
JEAN SMITH

/s/ W. L. Radke
W. L. RADKE

/s/ R. C. Robinson
R. C. ROBINSON

/s/ W. E. Hicks
W. E. HICKS

/s/ E. Evans
E. EVANS

/s/ H. H. Robinson
H. H. ROBINSON

/s/ E. K. Radke
E. K. RADKE

UNIT COMPANY INC.,

BY /s/ R. C. Robinson
R. C. Robinson, President

/s/ W. L. Radke
W. L. Radke, Secretary

This agreement, made 14th day of March 1948 by and between MILLARD F. SMITH, JEAN SMITH, of Arlington, Washington, W.L. RADKE, R. C. ROBINSON, W. E. HICKS, B. EVANS, H.H. ROBINSON, E.K.RADKE, all of Seattle, Washington, herein after called lessors, and the Unit Co., Inc., a corporation, herein after called lessee.

Witnesseth, that the lessors for and in consideration of ten dollars to them in hand paid, receipt of which is hereby acknowledged, and for the further consideration of the covenants and agreements hereinafter set out, do by these presents demise let and lease unto the lessee and it's assigns the following described unpatented placer mining claims of which lessors are the locators and claimants, said mining claims being more particularly described as follows:

a. Sauk #5 being the
E½ of NW¼ of Sec. 19, T31N, R11EWM
SW¼ of NW¼ of Sec. 19, T31N, R11EWM
SE¼ of NE¼ of Sec. 24, T31N, R10EWM

b. Sauk #6 being the
S½ of NW¼ of Sec. 18, T31N, R11EWM
E½ of SW¼ of Sec. 18, T31N, R11EWM

All of said claims being situated in Snohomish County, State of Washington.

This lease shall remain in effect for a period of ten (10) years from the date hereof, provided, however, that lessee may renew said lease for a further period of ten (10) years by notifying lessors in writing of its desire to do so at any time during the last six months of the ten year period.

By virtue of these presents lessee shall be entitled to exclusive possession of the claims described herein and shall be entitled to mine, remove, and sell the clays, rocks, sands and minerals, and particularly the pumice stone and pumice sand found thereon, and shall further be entitled to carry on all operations thereon connected with or desirable in the mining and removal of said materials and shall have the right to use the timber found on said claims for all of said purposes.

The lessee agrees to pay the lessors a royalty of eight (8) cents per cubic yard for every cubic yard of merchantable material or mineral mined and removed from said land, and a settlement for royalty shall be made on or before the 15th of each month for such minerals and materials loaded on railroad cars or trucks and shipped during said calendar month next preceeding.

The lessee agrees to keep a complete record of the entire output of the mine or mines that he may operate on said land and said record shall be open to the lessors for inspection at all reasonable times.

The lessee agrees to carry on the work of mining in accordance with customary methods, unless an unavoidable cause prevents.

Lessee's right to mining operations on above described property shall be exclusive and all the covenants, agreements and conditions shall be binding and endure to the heirs and assigns of lessors and lessee.

Lessee may terminate this lease at any time the mine, ceases to be profitable to operate, of which the lessee shall be judge, by giving the lessor thirty days' notice of his intention so to do and upon the expiration of said thirty days shall have the right and privilege to remove all the buildings, machinery and improvements now situated or hereafter erected upon the real estate hereby described, provided all royalties due and owing to the lessor shall have been paid.

/s/ Millard F. Smith
MILLARD F. SMITH

/s/ Jean Smith
JEAN SMITH

/s/ W. L. Radke
W. L. RADKE

/s/ R. C. Robinson
R. C. ROBINSON

/s/ W. E. Hicks
W. E. HICKS

/s/ E. Evans
E. EVANS

/s/ H. H. Robinson
H. H. ROBINSON

/s/ E. K. Radke
E. K. RADKE

UNIT CO. INC.,

BY: /s/ R. C. Robinson
R. C. Robinson, President

/s/ W. L. Radke
W. L. Radke, Secretary

WHITECHUCK, INC.

BALANCE SHEET

December 31, 1950.

## ASSETS

| | | | |
|---|---|---|---|
| **CASH** | | | |
| On Deposit | | | $ 145.64 |
| **CAPITAL ASSETS** | | | |
| Depreciable Assets | $ 14,556.53 | | |
| Less: Reserve for Depreciation | 3,395.24 | $ 11,161.29 | |
| Depletable Assets- Mining Development | | 20,499.89 | 31,661.18 |
| **OTHER ASSETS** | | | |
| Organization Expense | | 84.60 | |
| Building Plans | | 988.63 | |
| Miscellaneous Account Receivable | | 135.70 | 1,208.93 |
| Total | | | $ 33,015.75 |

## LIABILITIES

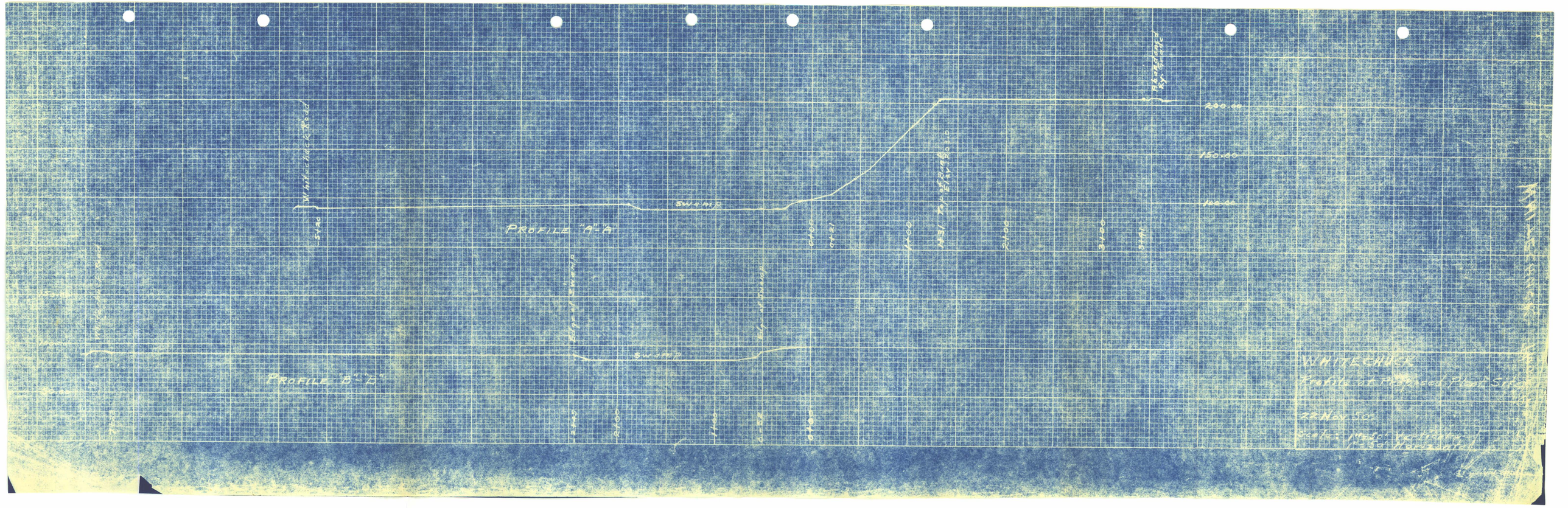
| | | | |
|---|---|---|---|
| **ACCOUNTS PAYABLE** | | | $ 4,175.33 |
| **NOTE PAYABLE** | | | 3,348.50 |
| **ACCRUED INTEREST PAYABLE** | | | 1,159.94 |
| **CAPITAL STOCK** | | | |
| Common Stock, $10.00 par value, issued and outstanding | | $ 12,390.00 | |
| **SURPLUS** | | | |
| Paid in Surplus | $ 19,260.00 | | |
| Earned Surplus- (Deficit) Dec. 31, 1949 | (1,077.33) | | |
| Loss for year ended Dec. 31, 1950 | 6,240.69 | ( 7,318.02) | 11,941.98 | 24,331.98 |
| Total | | | $ 33,015.75 |

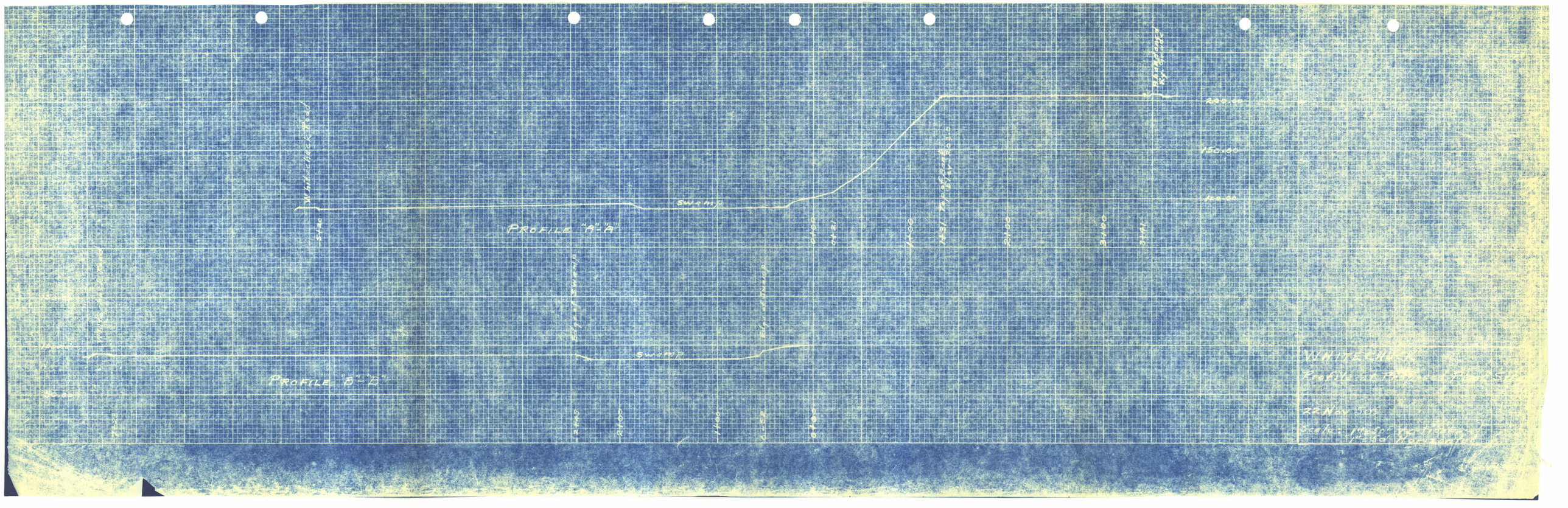
WHITECHUCK, INC.

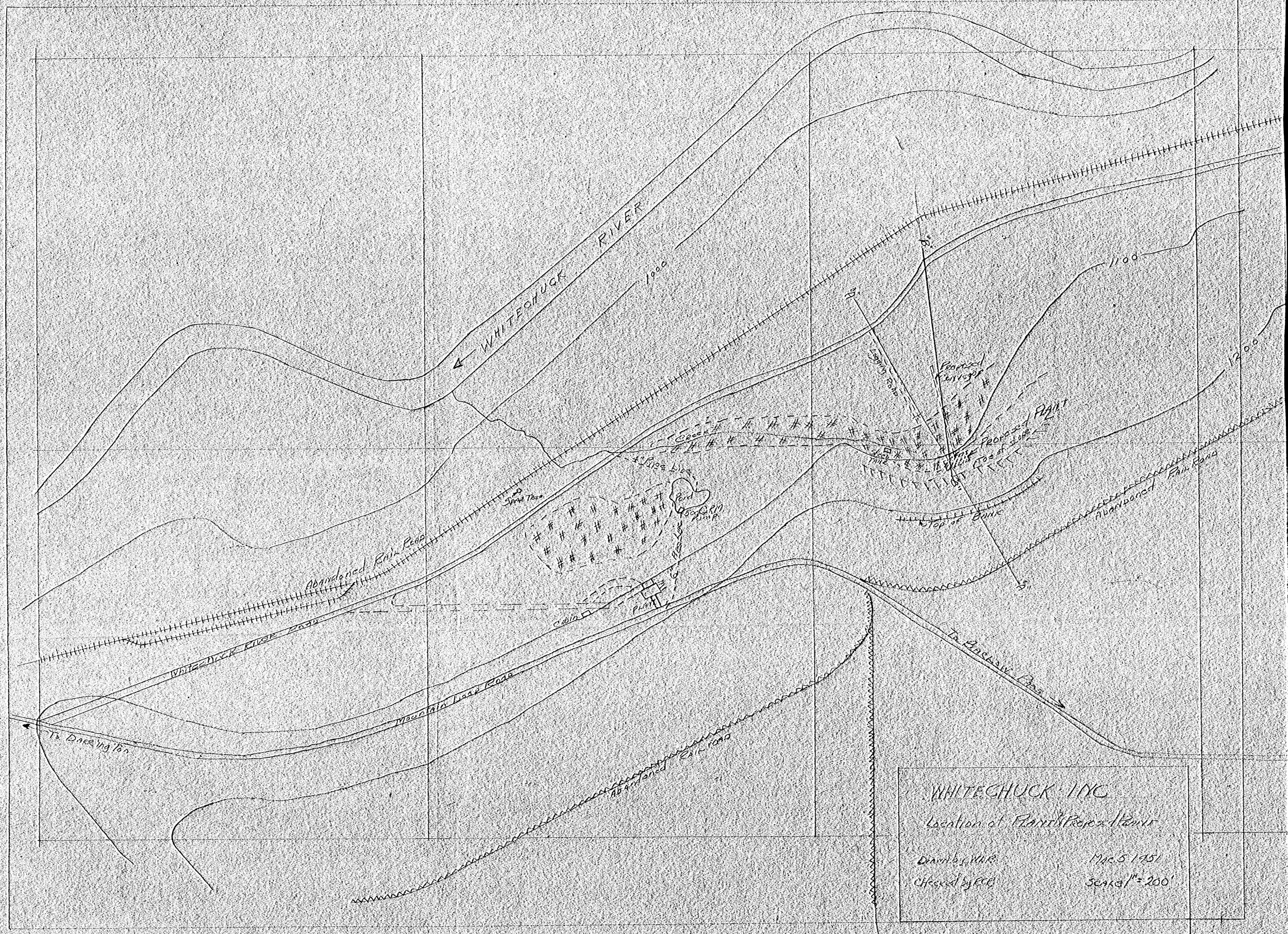
STATEMENT OF PROFIT AND LOSS

YEAR ENDED DEC. 31, 1950.

| | | |
|---|---|---|
| REVENUE | | $ None |
| EXPENSES | | |
| Bank charges | $ .70 | |
| Insurance | 123.02 | |
| Accounting | 100.00 | |
| Legal expense | 42.98 | |
| Miscellaneous | 45.62 | |
| Postage | 6.57 | |
| Travel expense | 3.44 | |
| Telephone and Telegraph | 2.52 | |
| Maintenance and Repairs | 244.59 | |
| Taxes | 163.34 | |
| Tax Penalties | 77.52 | |
| Depreciation | 1,724.02 | |
| OTHER DEDUCTIONS | | |
| Interest | 241.34 | |
| Losses by theft | 320.20 | |
| Loss on Sale of Land | 3,144.83 | $ 6,240.69 |
| Loss for year 1950 | | ($ 6,240.69 ) |


PROFILE "A-A"
PROFILE "B-B"
SWITCH
SWITCH
WHITE-HUT
22 MAY 1901


PROFILE "A"
PROFILE "B"


WHITECHUCK RIVER
1000
1100
1200
Logging Road
Proposed Riverpipe
Proposed PLANT
Toe of Slope
Top of Bank
Cover
Pond
Pump
Spur Track
Abandoned Rail Road
Abandoned Rail Road
Whitechuck River Road
Cabin
Plant
Mountain Loop Road
Abandoned Rail Road
To Darrington
To Barlow Pass
WHITECHUCK INC
Location of Plant & Proposed Plant
Drawn by WHR
Mar 5 1951
Checked by FCB
Scale 1" = 200'

WHITECHUCK HOLDINGS
SCALE 4" = 1 MILE
TOWNSHIP 32 NORTH
TOWNSHIP 31 NORTH
DANS CREEK
EAST FORK WHITECHUCK RIVER
BLISS FORK
WHITECHUCK RIVER
CREEK
31
35
3
2
1
10
11
12
15
14
13
18
19
22
23
24