DMA Form 1

DEFENSE MINERALS ADMINISTRATION
Control Slip

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DMA Docket No. 3408

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To:	600	Date	6/30/54
To:	Oper Com	Date	7-16-54
To:	600	Date	7-22
To:	Oper Com	Date	8-20-54
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CONTROLLED DOCUMENT

Date of Appl.: 6/23/54 DMEA NO.: [redacted]

DAVENPORT MINES, INC.
MARION, KENTUCKY

Date Rec'd: 6/30/54 Date Ack.: 6/30/54

MAILING ADDRESS: % Mr. Fred J. Pfunder (Prest.) State: Kentucky County: Crittenden
1106 Ninth Street
Highland, Illinois Region: VIII
(Emily Messerli, Sec. and Frank J. Zogg, Treas.)

Name of mine or facility: Davenport Mine

Metal(s) or mineral(s): Fluorspar, Lead & Zinc

Est. cost of Operation: $ 201,184

Amount Approved: $

Government Participation: %

Documents Received:
4 cys MF-103 4 cys reprint frm June '51
4 cys deed Pit and Quarry
4 cys mortgage 4 cys comb of 11 maps
4 cys subordination agreement
4 cys engineer's rpt (A.M.Reed)
4 cys historical data re. tonnage
4 cys rpt of W. D. Shipton, geologist
4 cys extracts frm R.I. 3943
4 cys rpt by J. H. Minshall
4 cys rpt by Phillip L. Jones

Date	Location	Date	Location	Date	Location
1. 6/30/54	NonMetallic Minls	5.		9.	
2. 7/19/54	Fld Tm Referral Region VIII	6.		10.	
3. 8/10/54	3 cys. Field Team rpt. To:H.B. To: NonMetallics	7.		11.	
4. 8/20/54	Denied. (DF)	8.		12.	

Name DAVENPORT MINES, INC. I-DM-E- DMEA NO.: [redacted]

Cys to USBM, USGS, Reg., and 600.

Rec'd 7/9/54 review of application dtd 7/8 frm GS. To: 600. 7/9.

Ltr dtd 7/19/54 frm Admin. to applicant advising of fld tm exam. To: 600 7/22.

Rec'd letr. 7/23 from oper. to Mittendorf in re. our letr. of 7/19/54. To 600 7/27/54

Field team report reviewed by oper com. 8/13/54. To 600 8/13/54

Review of field team report by Van Alstine dted 8/16/54. To 600 8/17/54

Letr. 8/20/54 from Adm. to oper. adv. appln' denied. To M&F 8/23/54

Letr. 10/4/54 from P. L. Jones req. inform about applicant. To 600 10/6/54

Letr. 10/11/54 from Houk to P. L. Jones adv. info. requested cannot be given to outsiders. To: M&F 10/12/54

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C. 600

Memorandum August 19, 1954

To: Administrator

From: Nonmetallic Minerals Division

Subject: A denial of exploration assistance and summary report.

1. DMEA Docket No. 3408 - Fluorspar-Lead-Zinc
Property: Davenport Mine
Crittenden County, Kentucky
Applicants: Davenport Mines, Inc.
Fred J. Pfunder, President
1108 Ninth Street
Highland, Illinois

Application: Form MF-103, received June 30, 1954.
Work proposed: Dewater mine to 350' level, install 8" pump, install 405 CFM two stage air compressor, construct 1,200' road, repair headframe, install 40 HP electric hoist, clean mud, repair timbers, install 3" air piping to 350' level, install new 20 lb. rails on 350' level, drill to S.W. on #4 vein with 2 machines 515', crosscut and raise 90' to workings for necessary ventilation with #3 shaft on 260' level, timber raise, drive from #3 shaft S.W. to #1 vein 675', drive N.E. on #1 vein 645' and on #4 vein 255', drive North on #3 to #1, 215'.
Amount requested by applicant $201,184.10.
No contract: Application denied.

2. Comments: Application is principally preparation for mining.

Geological criteria upon which denial is based: A good target exists which can be explored by surface drilling if the operator is agreeable.

Future possibilities: The possibilities of extending the known reserves in this mine are in depth at the intersection of the #1 and #2 veins with favorable geologic horizons.

Recommendations: The Nonmetallic Minerals Division concurs in the field team's recommendation to deny the application in its present form.
The Geological Survey concurs with the field team.
The Bureau of Mines concurs with the field team.

MME Form 7
(10-58)

OFFICIAL FILE COPY

Date	Surname	Code
4/28	Fe	110
	Jeffrey	120
4/28	on Rugu	100
		220

APR 30 1965

Hon. Frank M. Karsten
U. S. House of Representatives
Washington, D. C. 20515

Re: Docket No. DMEA-3408
(Fluorspar-Lead-Zinc)
Davenport Mines, Inc.
Davenport Mine
Crittenden County, Kentucky

Dear Mr. Karsten:

This will acknowledge receipt of your letter of April 23, 1965, enclosing letters to you dated March 30 and April 20, 1965, from Mr. Eugene B. Overhoff.

Evidently, Mr. Overhoff is interested in obtaining information concerning an application for a mining loan on the Davenport mine made in 1946 or 1947, by the Davenport Mines, Inc. to the former Reconstruction Finance Corporation. The RFC has been out of existence for a number of years and its files are in storage under the custody of the U. S. Bureau of Mines.

More recently, in June 1954, the Davenport Mines, Inc. filed an application for aid in an exploration project with the former Defense Minerals Exploration Administration which was denied. Mr. Fred J. Pfunder was President of the company, at that time and his address was 1108 Ninth Street, Highland, Illinois. In 1958 the DMEA was succeeded by the Office of Minerals Exploration, which has custody of its files.

Information submitted by an applicant for exploration assistance is considered confidential but may be released upon written authorization from the applicant. If the applicant is not the owner of the property, factual information submitted by the applicant may be released to the owner upon receipt of information showing the applicant no longer has an interest in the property. If a new owner is involved, evidence also must be given showing how the property was acquired and the new owner's title to it.

We are enclosing literature which describes the OME program of financial assistance in minerals exploration. This assistance is not available, however, for equipping a mine or for operating capital.

43683

Mr. Overhoff's letters are returned as requested.

Sincerely yours,

(signed) FRANK E. JOHNSON

Acting Director

Enclosures

FEJohnson/bih
4/30/65

cc to: Files
Dir. reading file
Region IV w/cy inc. ltrs.
Mr. C.W.Merrill - USBM, Room 3510
Mr. Johnson

FRANK M. KARSTEN
1ST DISTRICT, MISSOURI

MEMBER OF:
COMMITTEE ON WAYS AND MEANS
JEFFERSON NATIONAL EXPANSION MEMORIAL COMMISSION
MIGRATORY BIRD CONSERVATION COMMISSION

HOUSE OF REPRESENTATIVES
WASHINGTON, D.C.

April 23, 1965

OFFICIAL COPY
O. M. E.
RECEIVED
APR 26 1965
INTERCS CODE
110

Hon. Frank E. Johnson
Deputy Director
Office of Minerals Exploration
Interior Department Bldg. Room 4460
Washington, D. C.

Dear Mr. Johnson:

I am enclosing some correspondence I received from Mr. Eugene B. Overhoff, 1015 Locust Street, St. Louis, Missouri, 63101.

Unfortunately, I no longer have the file to which he refers and upon contacting the Bureau of Mines I was informed that the loan application of the Davenport Mines, Inc., was referred to your Office. It is my understanding that the loan but denied but possibly your files may contain the information Mr. Overhoff is seeking.

I shall appreciate it if you will advise me relative to this matter, with the return of Mr. Overhoff's letters.

Sincerely yours,

Frank M. Karsten

EUGENE B. OVERHOFF
ATTORNEY AT LAW
SUITE 708 LOCUST BUILDING
1015 LOCUST STREET
ST. LOUIS, MISSOURI 63101

CHESTNUT 1-0171

April 20, 1965

Honorable Frank M. Karsten
United States Representative
Sam Rayburn Office Building
Washington 25, D.C.

Dear Representative Karsten:

I want to thank you for your very nice letter of April 15, 1965 in answer to my request.

I would deeply appreciate any help that you might be able to give us in this matter and I know that my clients also would be very appreciative.

Since my last letter to you, I have again talked to my people and have additional information which may ring a bell with you concerning the loan application. Mr. John Tabin, one of my clients, told me that a Mr. John O'Donnell, who was in the Circuit Attorney's Office during the late '40's and the early '50's was the man that contacted you concerning the loan application for and in the name of Davenport Mines, Incorporated. This would have been in 1950. In 1946, a Mr. Funder, who was the mine manager, had made application to same Federal office for a $250,000 loan which was approved on a draw out basis for salaries and expenses. However, in the year of 1950, the last year which the mine was worked, it was flooded out and they then had mine receivership trouble which since has been entirely cleaned up and the Federal Court in Kentucky has now declared that the ownership of the ground is in the following names, all of which are from St. Louis. Vernon Hodge of the O.T. Hodge Clifs Company, Mr. Schaur of the undertaking company, Mr. Tony Scarpelli and Mr. John Tabin.

With this additional information, I would appreciate your checking on any past activity concerning loans made by this group as it may furnish me with a lead on applying for a loan at the present time.

I will also check the Area Redevelopment Administration office in Cuyuna, Missouri for any assistance they may be able to give me.

In closing, I want to thank you again for your help and interest in this matter and any possible help that you can give us in the future will be greatly appreciated. With kindest regards and best wishes, I am,

Very truly yours,

Eugene B. Overhoff

EUGENE B. OVERHOFF
ATTORNEY AT LAW
SUITE 708 LOCUST BUILDING
1015 LOCUST STREET
ST. LOUIS, MISSOURI 63101
CHESTNUT 1-0171

March 30, 1965

Honorable Frank M. Karsten
United States Representative
Sam Rayburn Office Building
Washington 25, D.C.

Dear Representative Karsten:

At the request of some clients of mine, I am writing to you concerning the possibility of obtaining financial assistance by way of a loan in order to develop mining property in Crittenden County, Kentucky. This is either in the Appalachian area recently referred to by President Johnson as needing assistance or on the edge of the Appalachian area.

Some years ago, this property was in operation and large amounts of fluorspar and zinc were removed from the mine. There is still a great deal of these minerals left in the ground which are known reserves accurately calculated by means of test borings. Some years ago, a dispute arose between the mine manager and the owners and the mine was shut down and has not been in operation for several years. All of the difficulties have now been straightened out and the owners are most anxious to start operations again; however, they will need between $300,000 and $350,000 to purchase machinery and have operating capital.

This will fit in with President Johnson's Appalachian Regional Development Act of 1965 in that immediate full time permanent employment to 20 to 30 people will be offered with the possibility of this amount of employees being doubled as soon as the mine is in full production.

My clients advise me that a Mr. Connelly had submitted an application to some governmental agency for a loan for these people and that the loan was tentatively approved. My clients believe that he contacted your office at one time concerning obtaining assistance in getting this loan for the property owners. If this is true, it would have been probably 7 or 8 years ago.

The purpose of this letter is to request whatever assistance or help that you may be able to give us by way of searching your old files and advising the department applied to for this loan so that I can resubmit the application or if you can suggest us with the proper department to apply to for a loan such as this.

The property in question is known as Davenport Mines and consists of approximately 26 acres owned outright along with approximately 100 acres which the mineral rights are owned by my clients.

Thanking you for any assistance that you may be able to give us in this matter and with kindest regards, I am,

Very truly yours,

EUGENE A. OVERHOFF

EAO/M

IN REPLY REFER TO:

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

August 16, 1954

Memorandum

REVIEW OF FIELD TEAM REPORT ON APPLICATION DMEA-3408 (fluorspar-lead-zinc)

To: L. G. Houk, Defense Minerals Exploration Administration
From: R. E. Van Alstine, U. S. Geological Survey
Applicant: Davenport Mines, Inc.
Name of property: Davenport Mine
Location of property: Crittenden County, Kentucky
Date of Field Team Report: August 2, 1954
Authorship of Field Team Report: W. T. Millar, USBM, and J. K. Grunig, USGS
Field Team's recommendation: Deny application in present form. Consider plan of underground or surface drilling, if applicant is willing to resubmit such a proposal.
Comments: A review of the original proposal indicates that it is not justifiable exploration as a DMEA project. R. D. Trace of the USGS and I favorably regard the revised plan set forth in the Field Team report.
ACTION RECOMMENDED: Follow Field Team's recommendation.

R. E. Van Alstine

R. E. Van Alstine

Docket Copy
Surname:

Lawrence G. Houk
Mitchelson

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C. 600

OCT 11 1954

Mr. Philip L. Jones
Consulting Engineer
405 Miners Bank Bldg.
Joplin, Missouri

Re: Docket No. DMEA-3408 -
Fluorspar-Lead-Zinc
Davenport Mines, Inc.
Davenport Mine
Drittenden County, Kentucky

Dear Mr. Jones:

Reference is made to your letter of October 4, 1954, requesting information on the status of application DMEA-3408 for exploration at the Davenport Mine, Crittenden County, Kentucky.

Information of this nature is disclosed only to the applicant. It is suggested that you contact Mr. Fred J. Pfunder, President, Davenport Mines, Inc., 1108 Ninth Street, Highland, Illinois, for the information you desire.

We regret that we are unable to comply with your request.

Sincerely yours,

SIGNED

Lawrence G. Houk, Chief
Nonmetallic Minerals Division

LGHouk:gad 10/8/54
Copy to: Admr. R. File
Docket
Field Team, Region VIII
Mr. Kiilsgaard, 5227
Mr. Arundale, 3516
Mr. Houk

PHILIP L. JONES
Consulting Engineer
MINERAL ECONOMICS & MINERAL DRESSING

TELEPHONE 7161

405 MINERS BANK BLDG.
JOPLIN, MISSOURI

DEPT. OF THE INTERIOR
Defense Minerals Administration
RECEIVED
OCT - 5 1954

October 4, 1954

Mr.C.O.Mittendorf,
Administrator D.M.E.A.
Interior Building,
Washington 25, D.C.

Dear Mr. Mittendorf:

Re: D.M.E.A application 3408

In connection with the above application by Davenport Mines Marion,Kentucky in which we supplied some engineering information and in which we are interested we would appreciate hearing from you what is the present status of this application.

Sincerely yours

Philip L. Jones

Philip L. Jones

Docket Copy
Surname:
Houk
Andrle
Martin
Jarraber
Hedges
Johnson

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C. 630

Mr. Fred J. Pfunder, President
Davenport Mines, Inc.
1108 Ninth Street
Highland, Illinois

Re: Docket No. DMEA-3408 - Fluorspar-Lead-Zinc
Davenport Mine
Crittenden County, Kentucky

Dear Mr. Pfunder:

Defense Minerals Exploration Administration has completed a study of your application for aid for an exploration project and other data relating to your proposal.

The proposed work is principally rehabilitation of existing mine workings after which the property would be ready for production at least for a certain period. The rehabilitation essentially is work that would be prosecuted primarily for mining or preparation for mining. Work of this nature is not permissible under DMEA Order-1, Amended, Regulations Governing Government Aid in Exploration Projects.

Under the circumstances, we regret to inform you that your application in its present form is denied. A program of deep-level diamond drilling exploration from the surface may be worked out if your company is interested.

We thank you for your interest and effort in the Defense Minerals Program and for bringing your property to our attention.

Sincerely yours,

C. O. Mittendorf (for)

Administrator

LGHouk:gad 8/19/54
Copy to: Admr. R. File
Docket
Field Team, Region VIII
Operating Committee
Mr. Newcomb, 5227
Mr. Arundale, 3516
Mr. Houk

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

August 9, 1954

Memorandum

To: George C. Selfridge, Chairman, Operating Committee, DMEA

From: Executive Officer, DMEA Field Team, Region VIII

Subject: Docket No. DMEA-3408 - (Fluorspar-Lead-Zinc)
Davenport Mines, Inc.
Davenport Mine, Crittenden County, Kentucky

In reference to your letter of July 19 on the subject docket, enclosed are the original and three copies of the Field Team's Review of Application.

W. T. Millar

W. T. Millar

Enclosures - 4

Reviewed by
DMEA OPERATING COMMITTEE
8-13-54
(date)

Field Team's Review of Application

by
W. T. Millar and J. K. Grunig 1/

Docket No. DMEA-3408 - (Fluorspar-Lead-Zinc)
Applicant: Davenport Mines, Inc.
Marion, Kentucky
Fred J. Pfunder, President
Box 126, Highland, Illinois
Property: Davenport Mine
Crittenden County, Kentucky

Reviewed by
DMEA OPERATING COMMITTEE
8-13-54
(date)

Summary

The applicant proposes work for 70 weeks at a total cost as follows:

6(b)	Labor, Supervision, Consultants	$88,762.00
6(c)	Materials and Supplies	45,639.44
6(d)	Equipment to be Purchased	37,156.17
	Equipment supplied by Applicant	11,327.00
6(e)	Rehabilitation and Repairs	4,857.00
6(f)	New Buildings, Improvements and Installations	1,370.00
6(g)	Miscellaneous	12,072.49
	Total -	$201,184.10

This application has been reviewed by the Field Team and discussed with R. N. Trace of the Geological Survey, who is thoroughly familiar with the geology and conditions at the Davenport Mine and who served as project geologist on the property during 1943 and 1944, when the Bureau of Mines conducted exploratory work in collaboration with the U. S. Geological Survey.

1/ W. T. Millar, Bureau of Mines and J. K. Grunig, Geological Survey.

Reports by consultants, accompanying the application, were reviewed.

It is noted that the mine is flooded and that the underground workings below 40 feet are inaccessible.

Also, the present underground developments in the mine are nearing the property lines.

The diamond drilling done by the Bureau of Mines in 1943-1944 explored the longitudinal extensions of No. 4 vein. DDH-83, within 50 feet of the southwest end line of the property, explored the No. 4 vein about 145 feet above the proposed drift on the 350-foot level and DDH-80, approximately 300 feet northeast of the southwest end line of the property, explored the No. 4 vein about 140 feet above the proposed drift on the 350-foot level. Neither hole showed the fault to have favorable width and only traces of fluorite were found. Both holes penetrated the fault at stratigraphic horizons which at other places in the mine were ore bearing. However both of these holes penetrated another fault east of the No. 4 vein which ought to intersect the No. 4 vein above the drill hole intercept and which probably accounts for part of the lack of displacement on fault 11 (No. 4 vein) where it was cut by DDH 80 and 83.

U. S. Bureau of Mines drilling off the northeast end of the property was equally discouraging. Their diamond drill holes 7, 8, and 9 cut the No. 4 vein at reasonably favorable horizons but it was narrow and contained only a small amount of fluorite.

On the basis of the results of this drilling the best remaining possibility for ore on the No. 4 vein lies below the present workings - at the Fredonia - Saint Louis contact - and to the east of the No. 4 vein. Deeper exploration on the No. 1 and No. 2 veins is also a possibility especially in

the vicinity of the probable intersection of these veins with No. 4.

The mine appears to be developed and estimates by consulting engineers, presumably employed by the Davenport Mines, Inc., show 10,000 tons of measured ore with indicated and inferred ore from 29,401 to 160,000 tons.

Apparently, the mine was well equipped for a producing operation but the equipment has deteriorated during years of idleness.

Conclusions

It is concluded that the work in this application is:

1. Equipment for a mining operation.
2. Rehabilitating a mine for production.
3. Development of ore reserves for production.

The mine is flooded and the most recent developments are inaccessible, therefore, the Field Team considers that no further information can be obtained by a field examination.

Furthermore, after the mine is unwatered it is probable that the shafts will have to be retimbered and considerable underground work which is not included in the application will be required.

Drilling by the Bureau of Mines during 1943-1944 along the strike did not encounter ore in the faulted area beyond the present workings. However, it is not considered that the 4 holes drilled on the Davenport Mine property by the Bureau of Mines were intended to delineate the ore body but to demonstrate the continuity of the mineralized faulted area. This does allow the possibility of a concentration of fluorite at greater depths.

It is concluded that further exploration of this deposit under the present condition (flooded and probably inaccessible) should be conducted by core drilling from the surface to a vertical depth of approximately 500 feet. The initial drilling would require 3 inclined holes approximately 700 feet

long and about 300 feet apart, totaling 2,100 feet, at a cost of $15,000. to $17,000. Further exploratory work would depend on the results of the preliminary drilling.

Recommendations

The Field Team recommends that the application as presented, be denied. It is further recommended that an alternative consisting of exploratory drilling from underground or from surface stations be considered if the applicant desires to resubmit the application.

Discussion

This application as presented seems to be more in order with rehabilitating and developing a mine for production than for a project to explore for a new deposit.

W. D. Shipton's report, 1946, accompanying the application, shows an estimate of 364,850 tons of proved, probable and possible ore reserves.

The accompanying report by Philip L. Jones, consulting engineer, 1952, shows 9,000 tons proved ore, 70,000 tons probable ore and 88,000 tons of possible ore, totaling 167,000 tons.

Based on the accompanying reports by consulting engineers, sufficient ore has been indicated to justify a mining operation for production of fluorspar under favorable market conditions.

The work proposed by the applicant consists of approximately 2,500 feet of drifting, crosscutting and raising. There is no definite line between exploration and development of mineral deposits but in this case development appears to be the chief objective. If the underground mine workings were accessible, exploration of veins No. 1 and 4 could be conducted by core drilling from workings on vein No. 2 and veins Nos. 1 and 2 could be explored by core drilling from workings on vein No. 4. (See section on print SF-353

of the application).

Since the underground workings are not accessible, the convergence of veins Nos. 1 and 2 with vein No. 4, as shown in the cross-section SF-353, could be explored more economically from the surface. Drilling from the surface could be conducted in two stages. Stage I would consist of 3 inclined holes approximately 700 feet long to explore the possible convergence of veins 1 and 2 with vein 4. A total of 2,100 feet of drilling at an estimated cost of $7.00 per foot would amount to $14,700. which seems more logical than the work proposed in the application which totals $201,184.10.

Previous work by the Bureau of Mines has proven the continuity of the fault zones along the strike within approximately 50 feet of the southwest property line, and on the northeast end, the drill holes extend under the adjoining property. Regardless of who conducts the proposed work, it seems that acquisition of the adjoining properties should be obtained for self protection before the cost of the proposed underground work is justified.

The section shown on print SF-353 accompanying this application indicates that veins Nos. 1 and 2 might converge with vein No. 4 at an approximate depth of 160 feet below the 350-foot level. Therefore, under the existing conditions of property rights and present stage of development, it seems logical to explore the convergence of the veins below the 350-foot level, rather than to incur the proposed expense of extending the underground workings to adjoining properties on which mineral rights have not been included with this application.

W. T. Millar, Executive Officer
Bureau-Survey Field Team
Defense Minerals Exploration
Administration, Region VIII

J. K. Grunig, U. S. Geological
Survey Member, Bureau-Survey Field Team
Defense Minerals Exploration
Administration, Region VIII

College Park, Md.
August 2, 1954

TELEPHONE 7286

Fred J. Pfunder
AND ASSOCIATES, INC.
Oil Producers
HIGHLAND, ILLINOIS

July 23, 1954

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

Re: Docket No. DMEA-3408 -
Fluorspar-Lead-Zinc
Davenport Mine
Crittenden County, Kentucky

Dear Mr. Mittendorf:

Your letter of the 19th received and I thank you and appreciate the courtesies shown.

I will get in touch immediately with Mr. W. T. Millar, Executive Officer, DMEA Field Team, and I can assure you that I will give him all the help that I can.

Sincerely yours,

Fred J Pfunder

President
DAVENPORT MINES, INC.

FJP:em

FILE COPY
Surname:

Houk
Arundale
Gould
Hedges
Setzer
Pfundner

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C. 600

JUL 19 1954

Mr. Fred J. Pfunder, President
Davenport Mines, Inc.
1108 Ninth Street
Highland, Illinois

Re: Docket No. DMEA-3408 -
Fluorspar-Lead-Zinc
Davenport Mine
Crittenden County, Kentucky

Dear Mr. Pfunder:

Your application for assistance in exploring the subject property has been reviewed by the Nonmetallic Minerals Division of the Defense Minerals Exploration Administration and has been referred to Mr. W. T. Millar, Executive Officer, DMEA Field Team, Region VIII, Bureau of Mines, Eastern Experiment Station, College Park, Maryland, for further consideration and possibly a field examination.

The Regional Office will contact you at an early date if an examination is to be made. Any assistance that you may give the members of the field team during the examination will be appreciated.

Sincerely yours,

C. O. Mittendorf

Administrator

LGHouk:ag 7/12/54
Copy to: Admr. R. File
Docket File
Field Team, Region VIII
Operating Committee
Mr. Arundale, 3516
Mr. Van Alstine, 5216
Mr. Houk

R.L.G.

FILE COPY
Surname:

Houk
Arundale
Selfridge
Hedges
Guild

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION
WASHINGTON 25, D. C. 600

JUL 19 1954

Mr. W. T. Millar
Executive Officer, DMEA
Field Team, Region VIII
Bureau of Mines
Eastern Experiment Station
College Park, Maryland

Subject: Docket No. DMEA-3408 -
Fluorspar-Lead-Zinc
Davenport Mines, Inc.
Davenport Mine
Crittenden County, Kentucky

Dear Mr. Millar:

Please review the subject application and arrange for a field examination if you deem it necessary.

Copies of memorandum from the Geological Survey, dated July 8, 1954, are enclosed for your information.

Sincerely yours,

George C. Selfridge

Chairman, Operating Committee (GCS)

Approved:

J. H. Hedges (JHB)
Member, Bureau of Mines

Philip W. Guild (JHB)
Member, Geological Survey

Enclosures 2

LGHouk:ag 7/12/54
Copy to: Admr. R. File
Docket File
Operating Committee
Mr. Van Alstine, 5216
Mr. Arundale, 3516
Mr. Houk

P.S. If a contract is to be recommended, please have the applicant execute new MF-201 forms revised February, 1953.

R.C.S.

IN REPLY REFER TO:
G-MD-CNM

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

DEPARTMENT OF THE INTERIOR
Defense Minerals Administration
RECEIVED
JUL 9 - 1954

July 8, 1954

Memorandum

REVIEW OF APPLICATION DMEA-3408 (fluorspar, lead, zinc).

To: L. G. Houk, Defense Minerals Exploration Administration
From: R. E. Van Alstine, U. S. Geological Survey
Applicant's name and address: Davenport Mines, Inc., Marion, Kentucky.
Name of property: Davenport
Location of property: On Claylick Creek, Crittenden County, Kentucky.
Summary of applicant's proposal: Dewater mine; 2,305 feet of drifting on three faults; about 125 feet of crosscutting; 90 feet of raising; miscellaneous rehabilitation work and preparation for mining; total cost $201,184.

Sources of information on applicant's property: 1) Four reports submitted with application. 2) Preliminary notes on the geology of the Moore Hill fault system, Crittenden and Livingston Counties, Kentucky: U. S. Geol. Survey open file report by W. R. Thurston and G. C. Hardin, Jr., 1945. 3) Geology and fluorspar deposits of the Moore Hill fault system, by Thurston and Hardin: U. S. Geol. Survey report in press. 4) Exploration for fluorite, Crittenden and Livingston Counties, Kentucky (Part 1 - Moore Hill fault vein, by X. B. Starnes): U. S. Bur. Mines Rept. Invest. 3943, 1946. 5) Report on Davenport Mines, Inc., Crittenden County, Kentucky, by S. A. Feitler, U. S. Bur. Mines, field report for DMA-370, April 1951.

Comments: Much of the proposed work is rehabilitation work and preparation for mining and hence does not qualify for government participation as exploration work. The proposed drifting, crosscutting, and raising are designed to open up veins nos. 1, 3, and 4 along the Moore Hill fault system, on the bottom (350-foot) level of the mine. Assay values and vein widths (7 determinations from applicant's map and 2 from U. S. Bur. Mines holes 80 and 7), however, suggest that the horizontal extensions of the veins may not be very good.

This mine has been an important fluorspar producer, and the best hope for additional ore on the applicant's property seems to lie in depth. A more modest program of deeper exploration seems worthwhile. The applicant has not shown why diamond drilling would not be feasible here as elsewhere in the Illinois-Kentucky field. The three veins might be explored in depth by diamond drilling

either from the surface (holes about 500 feet long) or from underground (holes about 150 feet long). Drilling from underground, although probably more advantageous, would entail dewatering the mine, the cost of which might outweigh the apparent advantages of underground drilling as a creek is shown on the applicant's map, crossing the vein 225 feet from the No. 4 shaft. No estimated cost for dewatering has been presented by the applicant.

RECOMMENDATION:

Refer to field team. Probably very little could be gained by a visit to the property, however, as the mine is said to be flooded to about 40 feet down in the No. 4 shaft. Feitler's 1951 visit (DMA-370, mentioned above) might substitute for a new field examination.

R. E. Van Alstine

R. E. Van Alstine

DMF

TELEPHONE XXXX 7286

Fred J. Pfunder
AND ASSOCIATES, INC.
Oil Producers
HIGHLAND, ILLINOIS

July 8, 1954

Mr. Lawrence G. Houk, Chief
Nonmetallic Mineral Division
U. S. Department of the Interior
Defense Minerals Administration
Washington 25, D. C.

Dear Mr. Houk:

I want to express my gratitude for the courtesies shown me by you on my visit to Washington on the Davenport matter.

With kindest regards, I am

Very truly yours,

Fred J. Pfunder

Fred J. Pfunder

FJP:em

June 30, 1954

Subject: DMEA-3408
Re: Exploration Assistance
Davenport Mine

Davenport Mines, Inc.
% Mr. Fred J. Pfunder
1108 Ninth Street
Highland, Illinois

Gentlemen:

The receipt of your application dated June 23, 1954 for exploration assistance under the Defense Production Act of 1950, as amended, is hereby acknowledged.

Your application has been assigned Docket Number DMEA-3408 and referred to the Non-Metallic Minerals Division.

Kindly refer to in any future correspondence relating to your application.

Sincerely yours,

Davenport Mines, Inc.

Ambassador

Marion, Kentucky

Highland, Illinois

June 23, 1954

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

Gentlemen:

I am enclosing herewith in quadruplicate Application for aid in an exploration project, pursuant to DMEA Order 1, under the Defense Production Act of 1950, as amended.

On December 18, 1952 we were given permission by Mr. Lawrence G. Houk to ask the aid of the DMEA office at Joplin, Missouri, in charge of Mr. Clint Know, in assisting our engineer, Mr. Philip L. Jones of Joplin, Missouri, with the preparation of this application.

Would appreciate your sending any replies to my address, 1108 Ninth Street, Highland, Illinois.

Very truly yours,

DAVENPORT MINES, INC.

Fred J. Brunder

Fred J. Brunder
President

FJP:em

Enc. 4

MF-103
(Revised April 1952)

UNITED STATES DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS EXPLORATION ADMINISTRATION

Form Approved.
Budget Bureau No. 42-R1035.2.

APPLICATION FOR AID IN AN EXPLORATION PROJECT, PURSUANT TO DMEA ORDER 1, UNDER THE DEFENSE PRODUCTION ACT OF 1950, AS AMENDED

Not to be filled in by applicant

Docket No. 3408
Metal or Mineral Fluorspar, Lead & Zinc
Date Received
Estimated Cost $201,184
Participation (Government %)

INSTRUCTIONS

1. *Name of applicant.*—(*a*) State here your full legal name, in the form in which you will wish to contract, and your mailing address: Davenport Mines, Inc., Marion, Ky. Incorporated in Kentucky
President: Fred J. Pfunder, Box 126, Highland, Illinois
Secretary: Emily Messerli, Box 126, Highland, Illinois
Treasurer: Frank J. Zogg, Owensboro, Kentucky

(*b*) If other than an individual, add to your name above whether a corporation, partnership, etc., and the name of the State in which incorporated or otherwise organized.

(*c*) If a corporation, add to above statement, titles, names and addresses of officers.

(*d*) If a partnership, add to the above statement the names and addresses of all partners. Not Applicable

2. *General.*—Read DMEA Order 1, "Government Aid in Defense Exploration Projects," before completing this application. Submit this application and all accompanying papers in quadruplicate (four copies), with your name and address on each sheet of the application and on all accompanying papers. Where sufficient space is not provided on the form for all required information, state it on an accompanying paper, with a reference in each case to the instruction to which it refers by number. Comply with all applicable instructions; or, if not applicable, so state. File the application with Defense Minerals Exploration Administration, Department of the Interior, Washington 25, D. C., or with the nearest field executive officer thereof.

3. *Applicant's property rights.*—(*a*) State the legal description of the land upon which you wish to explore, including all land which you possess or control that may be benefited by the exploration, and excluding any land or interest in land which is not to be included in the exploration project contract All of 2 tracts of land of more or less 145 acres in the County of Crittenden and State of Kentucky on the waters of Claylick Creek recorded in Deed book #72 at page 312, clerks office, Crittenden County Court as in enclosed paper 3(a) with exceptions enclosed

(*b*) State any mine name by which the property is known. Davenport Mine

(*c*) State your interest in the land, whether owner, lessee, purchaser under contract, or otherwise Owner
Certified copy of Deed enclosed and marked 3)c)

(*d*) If you are not the owner, submit with this application a copy of the lease, contract, or other document under which you control the property. Not applicable

(*e*) If you own the land, describe any liens or encumbrances on it Mortgage to Fred J. Pfunder for $209,353.19 enc. and marked 3 (e) with owners consent to lien.

(*f*) If the land consists of unpatented claims, add to the description above, the book and page numbers for each recorded location notice. Not applicable

4. *Physical description.*—(*a*) Describe in detail any mining or exploration operations which have been or now are being conducted upon the land, including existing mine workings and production facilities. State your interest, if any, in such operations. Also describe accessibility of mine workings for examination purposes. see encl. paper 4(a)

(*b*) State past and current production, and ore reserves, if any, giving quantities and grades. see encl. paper 4(b)

(*c*) Describe the geologic features of the property, including mineralization, type of deposit (vein, bedded, etc.), and your reasons for wishing to explore. Illustrate with maps or sketches. Send with your application (but not necessarily as a part of it) any geologic or engineering report, assay maps, or other technologic information you may have, indicating on each whether you require its return to you. see enclosed paper 4(c)

(*d*) State the facts with respect to the accessibility of the project: Access roads, distances to shipping, supply and residence points. see enclosed paper 4(d)

(*e*) State the availability of manpower, materials, supplies, equipment, water, and power. all available

5. *The exploration project.*—(*a*) State the mineral or minerals for which you wish to explore Fluorspar with lead, zinc and germanium minerals associated

(*b*) Describe fully the proposed work, including a map or sketch of the property showing a plan (and cross sections if needed) of any present mine workings, and the location of the proposed exploration work as related to such features as contacts, veins, ore-bearing beds, etc. see enclosed paper 5 (b)

(*c*) The work will start within 60 days and be completed within 18 months from the date of an exploration project contract.

(*d*) State the operating experience and background of the applicant with relation to the ability to carry out such exploration project, and also that of the person or persons who will supervise the operations. See encl. paper 5 (d)

6. *Estimate of costs.*—Furnish a detailed estimate of the costs of the proposed work (you will have to use a separate sheet), under the following headings. Add the totals under all headings to give the estimated total cost of the project:

(*a*) *Independent contracts.*—(Note.—If the applicant does not intend to let any of the work to contractors, write "none" after this item. To the extent that the work is to be contracted, do not repeat the cost of the contract-work in subsequent items.) State the cost of any proposed independent contracts for the performance of all or any part of the work, expressed in terms of units of work (such as per foot of drilling, per foot of drifting, per hour of bulldozer operations, per cubic yard of material moved, etc.). see enclosed paper 6

(*b*) *Labor, supervision, consultants.*—Include an itemized schedule of numbers, classes and rates of wages, salaries or fees for necessary labor, supervision and engineering and geological consultants. see encl. paper 6

(*c*) *Operating materials and supplies.*—Furnish an itemized list, including items of equipment costing less than $50 each, and power, water and fuel. see encl. paper 6

(*d*) *Operating equipment.*—Furnish an itemized list of any operating equipment to be rented, purchased, or which is owned and will be furnished by the Operator, with the estimated rental, purchase price, or suggested use-allowance based on present value, as the case may be. see encl. paper 6

(*e*) *Rehabilitation and repairs.*—Furnish a detailed list showing the cost of any necessary initial rehabilitation or repairs of existing buildings, installations, fixtures, and movable operating equipment, now owned by the Operator and which will be devoted to the exploration project. see encl. paper 6

(*f*) *New buildings, improvements, installations.*—Furnish a detailed list showing the cost of any necessary buildings, fixed improvements, or installations to be purchased, installed or constructed for the benefit of the exploration project. see 6

(*g*) *Miscellaneous.*—Furnish a detailed list showing the cost of repairs to and maintenance of operating equipment (not including initial rehabilitation or repairs of the Operator's equipment), analytical work, accounting, workmen's compensation and employers' liability insurance, and payroll taxes. see encl. paper 6

(*h*) *Contingencies.*—Give an estimate of any necessary allowances for contingencies not included in the costs stated above.

NOTE.—No items of general overhead, corporate management, interest, taxes (other than payroll and sales taxes), or any other indirect costs, or work performed or costs incurred before the date of the contract, should be included in the estimate of costs.

7. (*a*) Are you prepared to furnish your share of the cost of the proposed project in accordance with the regulations on Government participation (Sec. 7, DMEA No. 1)? Yes

(*b*) How do you propose to furnish your share of the costs?

[X] Money [X] Use of equipment owned by you [ ] Other

Explain in detail on acompanying paper. See enclosed paper 7 (b)

CERTIFICATION

The undersigned, whether as an individual, corporate officer, partner, or otherwise, both in his own behalf and acting for the applicant, certifies that the information set forth in this form and accompanying papers is correct and complete, to the best of his knowledge and belief.

Dated June 23rd, 1954

Davenport Mines Inc.
(Applicant)

By Fred J. Pfunder Pres.

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

U. S. GOVERNMENT PRINTING OFFICE 16—66551-1

3. (a) "The Mineral Right and mining privileges, including all of the mineral of whatsoever kind, in, on, and underlying the following described property, ..."

BEGINNING at a stake in the center of the Marion and Salem road; thence with same S 32 W 47½ poles to a stone, corner to Harpending; thence with Harpending line S 73 E 110 poles to a stone, inanother line of Harpending; thence with his line S 17 W 68 poles to a stone, corner to J. H. Conyer; thence with line of same S 73 E 160 poles to a stone in the Old Hall line; thence with same N 17 E 58 poles and 18 links to a hornbean; corner to Watson; thence with Watson's line N 70 W 24 poles to an ash; thence N 17 E 34½ poles to a sassafras and dogwood tree, corner to Brown; thence N 73 W 93 poles to a stake, beginning corner of arbitrary line established between Brewster and Austine; thence with said line N 47 W 48 poles to a stake; thence N 17 E 3½ poles to a black oak, corner to Brewster; thence with old line of Brewster N 17 W 100 poles to the beginning, containing 119 acres, be the same more or less.

The above and foregoing described boundary is "All of a certain tract of land in the County of Crittenden and State of Kentucky, on the waters of Claylick Creek.

This being the same mineral right and mining privileges conveyed to B. E. Clement, his wife, and C. W. Haynes and Susie G. Haynes, his wife, of Marion, Kentucky, by A. M. Davenport and his wife, of Crittenden County, Kentucky, of the 30th day of December, 1942, which said Deed of Conveyance is now of record in Deed Book #67, at page #326, Clerk's Office, Crittenden County Court.

Also the following described property: <u>SURFACE AND ALL SURFACE RIGHTS</u> in and to the hereinafter described property, lying and being in Crittenden County, Kentucky, on the waters of Claylick Creek, and bounded as follows:

BEGINNING at a stone in the Eagle line, corner to Waddell; thence with Waddell's line N 73 W 250' to a stone; thence with a new division line with Davenport S 42 W 1650 feet to a stone, new corner with Davenport, and in the Brown (formerly) Conyer line; thence with Brown's line S 73 E 1119 feet to a stone, corner Brown, and in the old Hall line; thence with Brown (formerly) Hall line N 17 E 58 poles and 18 links to a stone, another corner to Brown (formerly Watson) N 70 W 24 poles to a stone, corner to Brown; thence with a line of Brown, passing a corner between Brown and Eagle Fluorspar Co. at _____ feet and continuing with line of said Eagle Fluorspar Co. N. 17 E 34½ poles to the beginning, containing 26 acres, more or less.

This being the same surface and all surface rights in and to the above described tract of land conveyed by Mont Davenport and A. N. Davenport his wife, Crittenden County, Kentucky, on the 30th day of December 1942 to B. E. Clement and Edith L. Clement, his wife, and Susie G. Haynes, his wife, of Marion, Kentucky, which deed of conveyance

is now of record in Deed Book No. 67, at page 325, Clerk's Office, Crittenden County Court."

. . . . . .

STATE OF KENTUCKY

COUNTY OF CRITTENDEN ...SCT.

I, R. P. Davidson, Clerk of the County Court for the County and State aforesaid, certify that the foregoing is a true and correct copy of a Deed from B. E. Clement, Edith L. Clement, C. W. Haynes and Susie G. Haynes to Bert E. Conner Sr. as shown of record in Deed Book 72, page 317 in the Office of the Clerk of Crittenden County Court.

Given under my hand this 22 day of January, 1953.

R. P. Davidson, Clerk

BY Helen Hunt, D.C.

<u>Exclusion of land or interest in land which is not included in this project</u>

Not including any ore deposits that have been previously indicated by past exploration.

LEGAL DESCRIPTION OF LAND, EXCLUDING INTEREST NOT IN THIS PROJECT

CERTIFIED COPY OF DEED

THIS DEED OF CONVEYANCE made and entered into this 15th day of January, 1945, between B.E. Clement and Edith L. Clement, his wife, and C.W. Haynes and Susie G. Haynes, his wife, all of Marion, Crittenden County, Kentucky, parties of the first part and Bert E. Conner, Sr., Trustee, grantee, of Troy, State of Indiana, party of the second part,

WITNESSETH, That the said parties of the first part for and in consideration of the sum of SIXTY THOUSAND ($60,000.00) DOLLARS, paid and to be paid as follows; to-wit:

FIVE THOUSAND ($5,000.00) DOLLARS, cash in hand paid, to said grantors by the said Bert E. Conner, Sr., Trustee, the receipt of which is hereby acknowledged by grantors. And the further consideration of $ 3.00 per ton on 18, 334 tons of ore to be mined, milled and removed from the hereinafter described property by grantees, as such Trustee; and the still further consideration that the said Trustee, is to expend in exploratory work in development of the mines on said property and the mining thereon in the year 1945, the sum of TWENTY THOUSAND ($20,000.00) DOLLARS: and as a further consideration for this conveyance, the grantee, as such Trustee, hereby guarantees to grantors that not less than $5,400.00 in royalty payments will be made to grantors between the 15th day of January, 1945, and the 15th day of January, 1946, and a like sum paid each year thereafter, until the entire sum is paid; and grantee, Bert E. Conner, Sr., Trustee, is to pay all taxes due against said property in 1945 under the 1944 assessment or such as may be due in 1945, does hereby sell and convey to the party of the second part, as such Trustee, the following described property to-wit:

THE MINERAL RIGHT AND MINING PRIVILEGES, INCLUDING ALL OF THE MINERAL OF WATSOEVER KIND, IN, ON, AND UNDERLYING THE FOLLOWING DESCRIBED PROPERTY, EXCEPT, THE FINISHED ORE NOW ON HAND, THAT IS, THE MILLED AND READY FOR MARKET ORE, WHICH IS EXPECIALLY RETAINED and RESERVED FROM THIS CONVEYANCE BY GRANTORS, and which ore they shall have twelve months from this date in which to remove same from the premises.

BEGINNING at a stake in the center of the Marion and

All of the purchase money has been paid in full, we now release the lien mentioned in this deed.
Witness our hands this January 15, 1953.
B.E. Clement, Edith L. Clement, Susie G. Haynes Exec-Est. of C.W. Haynes, and Susie G. Haynes

Attest: R.P. Davidson, Clerk Critt. Co. Court.
By Mary June Shaffer D.C.

Application of DAVENPORT MINES, INC., Marion, Kentucky - Enc. 3(c) Page One

CERTIFIED COPY OF DEED

Salem; thence with same S 32 W 47½ poles to a stone, corner to Harpending; thence with the Harpending line S 73 E 110 poles to a stone, in another line of Harpending; thence with his line S 17 W 68 poles to a stone, corner to J.H. Conyer; thence with line of same S 73 E 160 poles to a stone in the Old Hall line; thence with same N 17 E 58 poles & 18 links to a hornbean; corner to Watson; thence with Watson's line N 70 W 24 poles to an ash; thence N 17 E 34½ ;poles to a sassafras and dogwood, corner to Brown; thence N 73 W 93 poles to a stake, beginning corner of arbitary line established between Brewster and Austine; thence with said line N 47 W 48 poles to a stake; thence N 17 E 3½ poles to a black oak, corner to Brewster; thence with old ling of Brewster N 17 W 100 poles to the beginning, containing 119 acres, be the same, more or less.

The above and foregoing described boundary is " All of a certain tract of land in the County of Crittenden and State of Kentucky, on the waters of Claylick Creek,

This being the same mineral right and mining privileges conveyed to B.E. Clement and Edith L. Clement, his wife, and C.W. Haynes and Susie G. Haynes, his wife, of Marion, Kentucky, by A.M. Davenport and his wife, of Crittenden County, Kentucky, of the 30th day of December, 1942, which said Deed of Conveyance is now of record in Deed Book # 67, at page # 326, Clerk's Office, Crittenden County Court.

Also the following described property; <u>SURFACE AND ALL SURFACE RIGHTS</u> in and to the hereinafter described property, lying and being in Crittenden County, Kentucky, on the waters of Claylick Creek, and bounded as follows:

BEGINNING at a stone in the Eagle line, corner to Waddell; thence with Waddell's line N 73 W 250' to a stone; thence with a new division line with Davenport S 42 W 1650 feet to a stone, new corner with Davenport, and in the Brown (formerly) Conyer line; thence with Brown's line S 73 E 1119 feet to a stone, corner Brown, and in the old Hall line; thence with Brown (formerly Hall) line N 17 E 58 poles and 18 links to a stone, another corner to Brown (formerly Watson); thence with another line of Brown (formerly Watson) N 70 W 24 poles to a stone, corner to Brown; thence with a line of Brown, passing a corner between Brown and Eagle Fluorspar Co. at ____ feet and continuing with line of said Eagle Fluorspar Co. N. 17 E 34½ poles to the beginning, containing 26 acres, more or less.

This being the same surface and all surface rights in and to the above described tract of land conveyed by Mont Davenport and A.N. Davenport his wife, Crittenden County, Kentucky, on the 30th day of December, 1942 to B.E. Clement and Edith L. Clement, his wife, and C.W. Haynes and Susie G. Haynes, his wife, of Marion, Kentucky, which deed of conveyance is now of record in Deed Book No. 67, at page 325, Clerk's Office, Crittenden County Court.

It is further agreed and expressly understood that the output of ores from this date, after having been milled and ready for market are not to be in any way or manner mixed with or piled on any of the ore metained by grantors, and neither is any of the crude ore, to be piled on or mixed with that retained by grantors.

It is further agreed and expressly understood that all Invoices and pay rolls accrued to January the 15th., 1945, are to be paid by grantors, and all accruing after January the 15th, are to be paid by grantee, Bert E. Conner, Sr., as such Trustee.

In case the grantee, or his assigns or successors, should at any time abandon the property or cease to mine and develop same in good faith, or fail or neglect to make each and all of the payments as due, then and in such event, all of the property and mining and mineral rights herein conveyed, shall forthwith be surrendered to grantors in good conditions, except the mineral removed and the natural wear and tear of the machinery and equipment.

This Deed of Conveyance is to be placed in escrow with the Farmers Bank and Trust Company of Marion, Kentucky, to be safely kept by it until all of its terms and conditions have been fully kept and taken care of by grantee, as such Trustee, or his assigns or successors, and when so kept and fulfilled, same is to be delivered to the said grantee, as such Trustee, or his assigns or successors; but if the terms and conditions of said deed have not been well and truly kept by grantee, then and in that event, this deed shall be by said Bank and Trust Company delivered back to grantors, and this whole matter finally terminated, EXCEPT, grantors are to keep and retain all money paid to them as the agreed cash payment and royalties due them under the terms of this deed.

TO HAVE AND TO HOLD the same, together with all appurtenances thereunto belonging, unto the said party of the second part as such trustee, his assigns and successors forever, with covenant of general warranty.

IN TESTIMONY WHEREOF, the parties of the first part Ha__ hereunto subscribed their names the day and year aforesaid.

B.E. Clement

Edith L. Clement

C.W. Haynes

Susie G. Haynes

(Revenue $ 66.00)

State of Kentucky)
) Sct.
County of Crittenden)

I, Elizabeth Ann Olive, (now Elizabeth Ann Olive McNeely, Notary Public, for the County and State aforesaid, certify, that the foregoing Deed of Conveyance from B.E. Clement, Edith L. Clement, C.W. Haynes and Susie G. Haynes, to Bert E. Conner, Sr., Trustee, was on the 16th. day of January, 1945, produced to me in said County and acknowledged before me by B.E. Clement, Edith L. Clement, C.W. Haynes, and Susie G. Haynes, parties grantor thereto to be their act and deed.

Given under my hand this 16 th. day of January, 1945.

My Commission Expires May 29, 1946.
N.D.

Elizabeth Ann Olive, Notary Public
(Now Elizabeth Ann Olive McNeely)

State of Kentucky)
) Sct.
County of Crittenden)

I, W.S. Lowry, Clerk of the County Court for the County and State aforesaid, certify that the foregoing Deed was on the 4th day of January, 1946, lodged for record, whereupon the same with the foregoing and this certificate have been duly recorded in my office.

Given under my hand this 4th. day of January, 1946.

W.S. Lowry, Clerk

BY Wanda Newbell D.C.

STATE OF KENTUCKY

COUNTY OF CRITTENDEN ...SCT.

I, R.P. Davidson, Clerk of the County Court for the County and State aforesaid, certify that the foregoing is a true and correct copy of a Deed from B.E. Clement , Edith L. Clement, C.W. Haynes and Susie G. Haynes to Bert E. Conner Sr. as shown of record in Deed Book 72 , page 317 in the Office of the Clerk of Crittenden County Court.

Given under my hand this 22 day of January, 1953.

R.P. Davidson, Clerk

BY Helen Hunt D.C:

CERTIFIED COPY OF MORTGAGE

THIS MORTGAGE made and entered into this 23rd. day of August, 1950, by and between Davenport Mines, Inc., a Kentucky Corporation, party of the first part and Mortgagor, and Fred J. Pfunder, of Highland, Illinois, party of the second part and Mortgagee,

WITNESSTH: THAT WHEREAS, the Mortgagor is justly and truly indebted to the Mortgagee in the sum of Two Hundred Nine Thousand Three Hundred Fifty-three and 19/100 ($209.353.19) Dollars, together with interest thereon at the rate of five and one-half (5½%) per centum per annum from December 31, 1949, until paid, which indebtedness is now due and owing; all as shown by the books and records of said Mortgagor,

NOW, THEREFORE, for the better securing of said indebtedness, and for and in consideration of the sum of One ($1.00) Dollar and other good and valuable considerations paid by the Mortgagee to the Mortgagor, the receipt and sufficiency of which are hereby acknowledged, the Mortgagor does hereby bargain, sell, alien, convey, transfer and mortgage to the Mortgagee, his executors, administrators and assigns, the following real and personal property, to wit:

Any and all real estate and interest in real estate and any and all mineral rights owned by or vested in said Mortgagor, incluing but not limited to that property and those interests and rights described in a deed dated October 23, 1945, from Bert E. Conner, Sr., Trustee, et al to Davenport Mines, Inc., of record in Deed Book 72, page 536, in the office of the Clerk of the Crittenden County Court.

Any and all personal property and interests in personal property owned by or vested in said Mortgagor, including but not limited to all machinery, equipment supplies, minerals, raw materials, motors, tractors, automobiles, trucks, motor vehicles, mills, Sink and Float plants, office equipment, desks, chairs, typewriters, adding machines and laboratory equipment whether located upon or in the property described in the deed referred to above, or elsewhere,

TO HAVE AND TO HOLD the same unto the Mortgagee, his executors, administrators and assigns, forever; PROVIDED , HOWEVER, that if the Mortgagor shall pay said indebtedness upon demand of the Mortgagee, this mortgage shall be null and void, and shall be satisfied of record, but otherwise it shall remain in full force and effect.

IN TESTIMONY WHEREOF, the Mortgagor has caused these presents to be executed in its behalf by its President and Secretary, they being thereunto duly authorized, this the day and year first above written.

Corporate Seal — Davenport Mines, Inc.

Attest: Emily Messerli, Secretary — By Fred J. Pfunder, President

STATE OF ILLINOIS

County of Madison....Sct.

I, Charlie Clark, a Notary Public within and for the State and county aforesaid, do hereby certify that the foregoing mortgage was on this day, in my said state and county, produced and acknowledged before me by Fred J. Pfunder and Emily Messerli, President and Secretary of Davenport Mines, Inc., to be the act and deed of said corporation and of themselves as its said President and Secretary, all of which I now certify to the proper office for record.

My commission expires Oct. 18, 1951.

In testimony whereof I have hereunto set my hand and affixed my seal of office this 24 day of August, 1950.

(N.S.) — Charlie Clark, Notary Public

STATE OF KENTUCKY

County of Crittenden....Sct.

I, R.P. Davidson, Clerk of the County Court for the County and State aforesaid, certify that the foregoing mortgage was on the 26th. day of August, 1950, lodged for record, whereupon the same, with the foregoing and this certificate, have been duly recorded in my office.

Witness my hand, this 26th, day of August, 1950.

R.P. Davidson, Clerk

By Patsy D. Carter, D.C.

STATE OF KENTUCKY

COUNTY OF CRITTENDEN...SCT.

I, R.P. Davidson, Clerk of the County Court for the County and State aforesaid, certify that the foregoing is a truee and correct copy of Mortgage as shown of record in Real Estate Mortgage Book 25 page 321 in the office of the Crittenden County Court Clerk.

Given under my hand this 26 day of Feb. 1953.

R.P. Davidson, Clerk

By Helen Hunt, D.C.

Application of DAVENPORT MINES, INC., Marion, Kentucky

Enc. 3(e)
Page One

CERTIFIED COPY OF MORTGAGE

DAVENPORT MINES INC.

TO

FRED J. PFUNDER

REAL ESTATE
BOOK 25
PAGE 321

$2.00 Clerk

MF-201
(June 1951)

UNITED STATES
DEPARTMENT OF THE INTERIOR
DEFENSE MINERALS ADMINISTRATION

SUBORDINATION AGREEMENT

KNOW ALL MEN BY THESE PRESENTS:

WHEREAS, the undersigned is the holder of a mortgage, claim, lien, or encumbrance identified and described as follows*:

See enclosed certified copy of mortgage - Enc. 3 (e).

upon that certain parcel of ground described in a certain Exploration Project Contract dated ....., 195...., between .....,

and the United States of America;

NOW, THEREFORE, the undersigned does by these presents subordinate all of his right, title, and interest in said mortgage, claim, lien, or encumbrance to the right, title, and interest of the United States of America under the provisions of said Exploration Project Contract, and agrees that the lien and claim of the United States of America under the provisions of said contract shall be prior to the undersigned's rights under the provisions of said mortgage, claim, lien, or encumbrance; and

The undersigned agrees to commit no act nor assert any right, title, or interest under said mortgage, claim, lien, or encumbrance that might contravene or conflict with the prior lien and claim of the United States of America under the provisions of said Exploration Project Contract.

This undertaking and covenant shall be binding upon the heirs, successors, and assigns of the undersigned.

Dated this 23rd day of June, 1954

Fred J. Gunder

*Include date of the instrument, and if recorded, book, page, and county of record.

U. S. GOVERNMENT PRINTING OFFICE 16—64581-2

4.(a) Past Mining Operations and Workings

Mine map is shown on SF-353 attached to this paper. The property has been developed through five shafts, No. 1 to No. 5 of which Numbers 1, 2 and 5 are now caved. No. 3 shaft is single compartment and is believed usable to the 260' level. No. 4 shaft is double compartment and was usable to the 350' level up to mid 1952 when the mine was flooded due to failure of the principal pump. The workings to the northwest on No. 1 vein consist of about 3,900 feet of drifts on 70', 100', 150', 200' and 260' levels largely stoped out on a nearly vertical vein on widths varying from 2' to 18' but averaging about 7'. Approximately 44,000 tons of crude ore has been stoped from here. (See 4(c) Enc. II, Clement's p. 2) These stopes are largely caved. The workings to the southeast of this, described as on No. 2 vein consist of about 2,500 feet of drifts on 200, 260 and 300 foot levels, largely stoped out on a nearly vertical vein nearly parallel to No. 1 vein on widths varying from 4' to 21' and averaging about 12'. Approximately 37,000 tons crude ore has been stoped from here. The workings to the east of this, described as on No. 3 vein (See 4(c) Enc. I Reed's p. 1) consists of about 1,200' of drifts on 260' and 350' levels with a few stopes on them. Above the 260' level there are workings on this vein or a parallel one described by Clements (See 4(c) Enc. II p. 3, Clement's). Approximately 7,000 tons crude ore has been stoped from here. The workings to the southeast of these described as on No. 4 vein (corresponding to No. 10 vein of USBM-RI No. 3943 - see 4(c) Enc. IV USBM fig. 3) consists of about 2,300' of drifts on the 200', 260', 300' and 350' levels, largely stoped out on a vein

dipping about 53 degrees towards No. 1 and No. 2 veins on widths from 4' to 20' averaging 8'. Approximately 45,000 tons crude ore has been stoped from here. At least 133,000 tons crude ore has been stoped all told since 1924, assaying approximately 51% CaF_2 with small quantities of lead and zinc. The stopes are largely caved. Shafts were cut 10' x 10' and completely cribbed. The drifts were cut 8' x 8' and heavily timbered. Stopes were mostly overhand, extensively timbered where necessary with stuls or leaning stope sets. Previously to 1948, ore for several years was extracted through No. 3 and No. 4 shafts, but subsequent to 1948 through No. 4, the only electric hoist.

In 1944 two drill holes, USBM 80 and USBM 83 (see 4(c) enc. IV, USBM RI-3949 pp. 5, 6, 8) were put down on the west of the property which crossed a vein probably No. 4 near the 300' level, but plotting these holes on the plan and elevations shows that these holes could hardly have maintained the inclination that they began with (see drawing SF-331 Section BB). Ore has been found on this vein 50' below where they probably intersected the vein. The other holes, USBM 8 and 9 (see 4(c) enc. IV, USBM RI-3943 pp. 5, 6, 7) were started on the north of the property but probably soon crossed the west boundary of the Davenport into the H. Watson property. Hole No. 8 crossed the vein near the surface probably No. 2 vein in the Davenport about 21' to 70' below surface and again at considerably greater depth. No. 9 found ore at various depths. Both holes probably did not penetrate far below existing workings.

The mine was dewatered by two 7" Pomona pumps, one in No. 4 shaft to 360' level and the other in a drill hole near No. 3 shaft to the

260' level and in addition there were two centrifugal pumps underground on the 350' level pumping to the surface which are now flooded (see 4(c) enc. VI, Jones' report, p. 6). Pumping capacity was about 1,000 g.p.m.

No. 4 shaft is equipped and workable, with headgear, electric hoist, cable to 350' level, 250 cfm compressor, hoist house and change room (see 4(c) enc. VI, Jones' report, p. 3). No. 3 shaft has a headgear but no electric hoist. There is a crushing and washing plant of about 8 tons per hour capacity in poor shape (see 4(c) enc. VI, Jones' p. 4) and a Sink and Float plant of about 15 tons per hour in good shape (see 4(c) enc. VI Jones' p. 4, 5). Up to 1952 there was a float mill of about one-half to one ton per hour feed capacity that is now removed. (see 4(c) enc. V Minshall's p. 7).

The property has about 200 kw transformer capacity and line distribution. There is an adequate general office with truck scale and an attached assay office, machine shop, powder magazine water supply and tailing disposal. (see 4(c) enc. VI Jones' pp. 3-6).

Applicant's Interest in Above Operations

Davenport Mines Corp. operated this property since the beginning of 1945, and stoped as had the previous owners little more than 25 tons per day from the mine. The property was electrified in 1948 and above described mill was installed in 1949 by Davenport Mines, Inc. The mill was operated at a tonnage higher than the mine then supplied and the extra ore was obtained from dumps on the property and custom ore milled.

A new management entered in 1950 and apart from deepening No. 4 shaft to 350' and indicating some ore on that level let much surface equipment deteriorate and disperse (see 4(c) enc. V, Minshall report). In January 1953 this management was removed.

Accessibility of Workings

The mine is flooded to about 40' down in the No. 4 shaft and no underground workings are available for inspection until the property is dewatered.

4.(b) Past Production Record

Fluorspar:

Year	Tonnage	Grade % CaF_2	Remarks
1924/1930	7,800	60%	Sold as crude ore
1930/1944	47,115	75%	Milled & sold as finished metallurgical spar - operation by National Fluorspar Co.
1945	2,821	75%	First year operation Davenport Mines
1946	1,111	75%	Operation by Davenport Mines Steel strike reduced output
1947	4,998	75%	Operation by Davenport Mines
1948	2,876	75%	Operation by Davenport Mines Electrifying property
1949	1,231	75%	Operation by Davenport Mines Erecting new mill
1950	1,096	75%	Operation by Davenport Mines New management took over
1951	600	40%	Not milled. Sold as crude ore
1952	500	40%	Not milled. Sold as crude ore
TOTALS	70,148	72.8%	

The above data was obtained as follows:

Tonnages for 1924/1944 from 4(c) enc. IV USBM P. 4)

Tonnage for 1945/1950 from records kept by Davenport Mines, Inc.

Tonnage for 1951, 1952 estimated from local information.

It is estimated that about 63,000 tons of waste and tailings were eliminated during the above production period assaying about 23% CaF_2. The total mined ore therefore ran about 133,000 tons at 51% CaF_2.

Lead:

Year	Tonnage	Grade % Pb	Remarks
1947	77.485	77%	From jig mill only years 1946 & 1947. Subsequently new mill not equipped to recover lead.

Current Production

There is no current production.

Ore Reserves

The ore reserves consist of:

(a) Indefinite quantities of indicated ore remaining above 300' level and higher levels left because of high lead or zinc content possible 1,000 to 5,000 tons running 45% CaF_2 with 5% to 10% Zn and 1% to 2% Pb.

(b) Indicated ore abovethe 350' level: 8,300 tons at 42% CaF_2.

4.(c) Geology

The structure consists of a number of steeply dipping parallel faults in the Mississippian system of sedimentaries (see especially drawing SF-353 and enc. IV USBM RI No. 3943). The faults are mineralized by varying widths of calcite, fluorspar, galena, sphalerite and pyrite. (see 4(c) Enc. III Shipton p. 1). The main fault known as Davenport vein No. 1 is part of the Moore Hill fault No. 72 striking Northeast to Southwest across Livingston and Crittendon counties (see 4(c) enc. IV USBM fig. 1). It dips at 80° SE on the Davenport (see SF-353, section BB). Parallel to this and 90 feet to the SE is Davenport No. 2 vein dipping at 84° SE which joins No. 1 vein about 330' from the Southwest boundary and joins No. 1 again on the Northeast boundary. Parallel again and 550 feet away from Davenport No. 1 is Davenport No. 4 (known in 4(c) enc. IV USBM fig. 3, as No. 10) dipping Northwest 53° towards No. 1 and 2 faults. Across the middle of the property is at least one cross vein, Davenport No. 3 striking north and dipping 85° east (see SF-353, 4(c) enc. I Ree p. 1 and 4(c) enc. II Clement p. 3). The country rock at the surface on the foot wall of No. 1 fault is in the bottom of the Renault limestone of the Chester series of the Mississippian or the top of the Genevieve series. Between No. 1 and No. 2 the series is dropped about 100' bringing the Bethel of the Chester series to the surface. Between fault No. 2 and No. 4 the series is dropped a further 160' bringing the top of the Cypress or the bottom of the Golconda of the Chester series at the surface. To the southeast of No. 4 fault the Bethel is about the same

elevation as between faults No. 1 and No. 2 and is at the surface. (see section BB Drg. SF-353). The faulted zone, mineralized or not, varies in width from 2' to 20'. The fluorspar ore bodies are irregularly spaced over the whole of the fault system on this property, ore shoot extending up to at least 800' but most being in general considerably less.

Reasons for Exploration

Faults with wall rocks in the St. Genevieve and St. Louis limestones are favorable to fluorspar ore bodies (see 4(c) enc. III Shipton, p. 1) and recur at Davenport on all faults below the 300' level.

The ore bodies are not continuous either vertically or horizontally (see 4(c) Enc. III Shipton p. 1) but on the Moore Hill system the ore bodies are of continual occurrence (see 4(c) enc. IV USBM fig. 1,2, 3). Drifting with determination on the strikes of the faults is the only satisfactory and economic way of indicating these bodies.

There was a pronounced pinch-out on the 250' level (see drawing SF-353 section BB) which probably influenced the original owners (National Fluorspar Co.) to sell in 1945. This pinch-out however was not permanent and ore bodies appeared again on the 300' level of the No. 2 vein and the 350' level of No. 4 vein.

It is acknowledged that No. 1 vein which is the USBM fault No. 71 of the Moore Hill system is the main vein through which others were mineralozed (see 4(c) enc. III Shipton p. 2) and therefore since ore bodies ocurred in No. 2 and 4 below the 260' pinch they can be equally well experienced in No. 1 below the 260' level. The No. 1 vein was not developed below the 260' level. The veins are closing together and their closure could

be expected to yield large ore bodies, indications of which may occur as high as the 350' level.

The older workings, especially on the No. 1 and 2 veins are almost completely caved and reopening them from the No. 4 shaft in view of their heavy timbering would be difficult and expensive and could only be expected to indicate ore bodies between the present workings and the boundary.

Exploration on the 350' level which is already started, but is not caved, on the other hand would indicate all bodies existing on that level over the whole fault system and especially on No. 1 vein that is unexplored below 260'.

The following reports accompany this application that include technological information of relevance. They are not to be returned:

Enc. I - W. A. Reed's Report - Nov. 7, 1943

Enc. II - P. E. Clement's Report - April 6,1946

Enc. III - Dr. W. D. Shipton's report April 15, 1946

Enc. IV - U.S.B. of M. RI 3943: extracts: Sept. 1946

Enc. V - J. H. Minshall's report - Oct. 16, 1951

Enc. VI - Philip L. Jones' Report - Nov. 11, 1952.

4.(d) Accessibility

There is a well kept road into the property. The nearest rail shipping point is Marion, Kentucky, nine miles by road. Ore can also be shipped by barge from the Elizabethtown ferry landing, six miles by road. Supplies can be obtained in Salem, three miles by road and Marion, nine miles. Heavy supplies of all kinds can be obtained from Paducah, thirty-five miles by road. There are good residence points at Marion, nine miles and Salem, three miles and numerous smaller points nearer.

5.(b) Proposed Work - See 4(a) SF-353 Marked in Red

A - Dewater mine to 350' level

B - Install new 8" deep well pump to ensure mine will never be flooded again

C - Install new 405 CFM (delivered) two stage 100lb. air compressor

D - Cement stream bed over outcrop of No. 1 and No. 2 faults to prevent leakage of pumped water back into workings

E - Make new road 1,200' long for dumping development ore and waste to the southeast of present road allowing a slope on which up to 12,000 tons of broken rock can be dumped by dump truck and spread by bulldozer

F - Repair No. 4 headframe, install new and larger head sheave and new cable, and truck loading arrangements

G - Install new 40 horsepower electric hoist and cable for 350' hoist at No. 3 headframe, repair headframe and install truck loading arrangements

H - When mine dewatered clean up 350' level of mud, repair timbers in drifts and shafts where necessary

I - Install new 3" air piping from compressors to 350' level using existing 2" pipe for branches underground as far as it will go.

K - Install new 20 lb. rails on 350' level in place of existing 12 lb. so that a 12B Eimco loader can operate over track.

L - Begin drilling of the drift to the southwest on No. 4 vein with two machines at face to boundary (515 feet). Dump ore on surface by truck and spread pile by bulldozer

M - Crosscut to No. 3 shaft and raise 90' to connect workings for necessary ventilation with No. 3 shaft on 260' level, timber raise and use shaft for hoisting exploration rock when necessary

N - Drive from No. 3 shaft southwest on No. 1 vein to boundary (675')

O - Drive northeast on No. 1 (645') and No. 4 (255') vein to bound.

P - Drive north on No. 3 to No. 1 vein (215').

5.(d) Operating Experience

Fred J. Pfunder, President of Davenport Mines, Inc. was President of Company from 1945, its inception until May 1950. Previously operated oil leases in Oklahoma, Illinois and Kentucky.

Frank J. Zogg, Treasurer of Davenport Mines, Inc. is owner and operator of Randall-Zogg Supply Co. handling mining, oil drilling, and industrial machinery and equipment at Owensboro, Kentucky.

Orville Pfunder, Superintendent and Assayer acted as Superintendent and Assayer of Davenport from 1948 to 1950.

Johnson Hurst, master mechanic. Worked as master mechanic in north Kentucky field for twenty years and at Davenport for over seven years, up to 1952.

William Hurst, mine foreman. Worked as miner and mine foreman in north Kentucky field for over eighteen years and at Davenport for fourteen years.

Philip L. Jones AIME, late manager of The Sink and Float Division of C. Tennant, Sons & Co. of New York, consulting and designing engineer will oversee mining and milling operation. For last thirteen years carried on consulting and designing business in mining and milling in U. S. A. and South America. Recently designed the Hayden Creek Plant of St. Joseph Lead Co., Bonne Terre, Mo. and the plant and equipment of the Frojo MiningCo. of Joplin, Mo. Office and staff in Joplin, Mo. will handle this operation.

6. Estimate of Cost

(a) Independent Contracts: None

(b) Labor, Supervision and Consultants

Labor:

1 Foreman @ $1.63 hourly for 70 weeks	$ 4,564.00	
3 Machine men at $1.56 hourly for 70 wks.	13,104.00	
9 Trammers, timberman, hoistmen @ $1.25 hourly for 70 weeks	31,500.00	
1 Dumper @ $1.12 hourly for 70 weeks	3,136.00	
1 Pumpman, night watchman @ $75 for 70 wks.	5,250.00	
Supervision:		
1 Superintendent & Assayer @ $400 per month for 16 months	6,400.00	
1 Master mechanic @ $350 month for 16 mos.	5,600.00	
1 Mechanic @ $275 per month for 16 mos.	4,400.00	
1 Mechanic & truck drive @ $200 per month for 16 months	3,200.00	
1 Bookkeeper @ $100 permonth for 16 mos.	1,600.00	
Consultants:		
7 days monthly @ $90 daily for 16 months	10,008.00	
		$ 88,762.00

(c) Operating Material & Supplies

Blasting powder 12,620 lbs. @ $.2035	2,568.17
Fuses, 16 1,536 ft. @ $.0115	1,857.66
Caps 12,620 @ $.017	214.54
Drill steel 14,639 lbs. @ $.22	3,220.58
Hand Tools, various	454.32
Carbide 2840 lbs. @ $.08	227.20

Fuel Oil 3,155 gals. @ $.16	504.80	
Gasoline 755 gals. @ $.20	151.00	
Coal 32800 lbs. @ $.014 (for blacksmith's shop)	459.20	
Lubricating grease 5048 lbs. @ $.13	656.24	
Lubricating oils 379 gals. @ $.72	272.88	
Steel piping replacement 656' @ $.59	387.04	
Track replacement 303' @ $.89	269.67	
Timbers 8' long 5679 @ $2.10 ea.	11,925.90	
Roofing 118 cords wood 48" @ $10.50 per con.	1,239.00	
Spiling 9086 pieces @ $.35	3,180.10	
Assaying Supplies	324.00	
Power 1,266 224 kw hrs. @ $.014	17,727.14	
		$ 45,639.94

(d) Operating Equipment

Rented: None

Equipment to be purchased: as specified or equivalent:

1 Johnson turbine 1,000 gpm, 8"x360' col. 125 hp motor and switchgear	8,250.00
1 90 M integral Ingersoll Rand 2 stage compressor, 405 cfm del. 100 hp & switchgear	5,600.00
1 Air Receiver 4'd x 12'l	250.00
1 F-6-2T, 2 speed axle dump trucks and bed	3,300.00
1 D-4 Bulldozer	8,400.00
1 12B Eimco air loader	3,117.00
1 40 hp electric hoist and switchgear	3,300.00
1 Drifter and stand	800.00

780' 3" pipe @ 69.67/100'	543.43	
585' 2½" pipe @ 53.26/100'	311.57	
1090 2" pipe @ 33.92/100'	369.73	
3260' of 20# track comp. @ 89.40/100'	2,914.44	
Total Equipment Purchased		$ 37,156.17

Equipment furnished by Davenport Mines, Inc.

Suggested use allowance for 16 months

#4 Headframe value $1,000 allowance	267.00
#3 Headframe value $750 allowance	200.00
2-7" Pomona pumps value $11,000 allowance	2,937.00
1 hot water heater $350 allowance	93.00
8 1000 lb. cans $640 allowance	171.00
2 1 ton dump cars $275 allowance	73.00
Miscellaneous tools $500 allowance	134.00
1½" Sunbeam pump $150 allowance	40.00
1 Bench grinder $50 allowance	13.00
2 Forges $300 allowance	80.00
1 Gardner Denver bit machine $1800 allowance	481.00
1 Press drill $100 allowance	27.00
1 United Iron Works 40 hp hoist $3000 allow.	801.00
700' 3/4" cable $1120 allowance	299.00
1 Sentinel 250 cfm comp. $4500 & receiver	1,202.00
1 Braun sample jaw crusher $350	93.00
1 Braun sample disc pulverizer $350	93.00
6 transformers and elec. dist. $6900	1,842.00

2 hoists at #3 shaft $1300 allowance	347.00	
Handtools $250 allowance	67.00	
1 3" Fairbanks Morse underground pump $1450	387.00	
1 2" " " " " $1240	331.00	
2 Jackhammars, post and arms $800	214.00	
1 Stoper and stand $800	214.00	
3 mine cars $150	40.00	
1000' 2" piping $3300	881.00	
Total Use Allowance		$ 11,327.00

(e) Rehabilitation and Repairs

Repairs to #4 headframe and dump truck loading chute, lumber, bolts, nails:	1,100.00	
Sheave	60.00	
Repair to #3 headframe, lumber, bolts, nails	1,000.00	
900' of 5/8" plough steel cable	297.00	
Retimbering shafts & 350' level	1,400.00	
Repairs on miscellaneous tools & equip.	1,000.00	
		$ 4,857.00

(f) New Buildings, Improvements & Installations

Making new road for dump:		
Materials -	600.00	
Labor taken care of in 6(b)		
Gas and oil taken care of in 6(c)		
Repair parts taken care of in 6(g)		
Concreting stream over #1 and #2 vein outcrop -		
Concrete and scrap iron reinforcing	400.00	

Labor costs taken care of in 6(b)		
Gas and oil taken care of in 6(c)		
Repair parts taken care of in 6(g)		
Installing new 405 cfm compressor & rec. lumber and nails	100.00	
Concrete	100.00	
Labor taken care of in 6(b)		
Installation of 8" deep well pump:		
Labor by manufacturer	120.00	
Equipment	50.00	
Total		$ 1,370.00

(g) Miscellaneous

Repair parts drills	816.62	
" " loader	798.00	
" " compressors	578.55	
" " hoists	798.00	
" " drill sharpener	399.00	
" " truck	926.00	
" " bulldozer	1,168.00	
Analytical work (check assays)	88.00	
Accounting	200.00	
Workman's comp., emp. liability and payroll @ 8% of $78,754.00	6,300.32	
Total		$ 12,072.49
Grand Total		$201,184.10

PROPOSAL FOR APPLICANT'S SHARE OF COSTS

Applicant proposes to furnish their share of the cost by money, less allowance of operating equipment, as in Schedule 6(d).

4(c) ENC. I

ENGINEER'S REPORT

ON

DAVENPORT MINE

by

Avery H. Reed, Jr.
Mining Engineer

Marion, Kentucky

November 7, 1943

(not to be returned)

ENGINEER'S REPORT

ON

DAVENPORT MINE

LOCATION. The Davenport Mine of the National Fluorspar Company is located about 6 miles southwest of Marion, Crittenden County, Kentucky. An improved road connects from the mine to U. S. Highway #60.

DESCRIPTION. This is a fluorspar mine, producing fluxing or metallurgical fluorspar. Property holdings consist of 120 acres of mineral rights, and 26 acres of surface in the vicinity of the mine plant. Ownership is vested in the National Fluorspar Company, a partnership, composed of B. E. Clement and C. W. Haynes, both of Marion, Kentucky.

STRUCTURAL GEOLOGY. The property is traversed from NE to SW by the Lower Moore Hill Fault System. This system is composed of several sub-parallel and intersecting normal faults, which extend for miles either side of the property. As disclosed in the mine workings, these faults may be described:

No. 1 fault or west fault: A continuous fracture traversing the property, and forming the westerly boundary of the fault system. The displacement and dip is to the east, with about 250' throw, having at the surface the St. Genevieve Limestone on the west, and the Bethel sandstone on the east side.

No. 2 fault or east fault: A continuous fracture which roughly parallels No. 1 fault, but which intersects it on strike near the North property line, and again about 250' south of No. 3 shaft. Together, these two faults enclose a long narrow wedge shaped fault block. The displacement and dip is to the east, with about 100' throw at the center, having at the surface the Bethel sandstone on the west, and the Cypress sandstone on the east side.

No. 3 fault or cross fault: A short strike fault connecting No. 2 and No. 4 faults, in the vicinity of No. 3 shaft. The displacement, which is less than 50', is to the east, and latterly, along the strike, to the south. This fault has not been encountered above the 260' level.

No. 4 fault or new fault: A continuous fracture traversing the property, and forming, perhaps, the easterly boundary of the fault system. The displacement and dip is to the west, with about 200' throw, having at the surface the Cypress sandstone on the west, and perhaps the Renault limestone on the east side. This fault dips very sharply, and may intersect No. 2 fault on the dip at about 500' deep.

Numerous minor faults and fractures are apparent, striking and dipping at random, in the breccia or fault zone between No. 1 and No. 4 faults.

MINE DEVELOPMENTS:

Caved workings: The upper levels and stopes, and several shallow shafts are caved and inaccessible. However, the mine map faithfully records the amount and nature of these workings.

No. 1 shaft: A large permanent shaft, 200' deep, sunk off the vein. Permanent levels are driven at 200'.

No. 3 shaft: A medium sized shaft 260' deep, sunk on the vein, in good condition. Levels were driven at 70', 100', and 200'. A permanent level is driven at 260'.

No. 4 shaft: A large new shaft 300' deep. Permanent levels are starting at 300', and connection has been made with the 260' level. These three shafts are connected on variousllevels, and natural ventilation is good.

ORE DEPOSITS: The faults at the Davenport Mine are extensively mineralized with commercial ore deposits of fluorspar and associated minerals. These ore deposits occur as irregular lens-shaped orebodies localized along and confined by the faulted fractures. These orebodies consist mainly of fluorspar, with calcite, and minor metallic sulphides. In the course of mining, twelve of these economic orebodies have been encountered:

No. 1 orebody on No. 1 vein: The discovery orebody at this mine. First located by shallow shafts, and developed from the 40' level. Ore above 40' high grade gravel spar. Developed from 100' level, ore was high grade gravel and soft lump. Developed from 200' level No. 1 main shaft, ore was high grade mill ore. All the ore was stoped above 200' and the orebody does not go below 200'. Roughly 100' x 100' x 8' wide.

No. 2 orebody on No. 1 vein: Located at 150', and stoped out. Ore was high grade mill ore. No ore below 150'. Roughly 175' x 50' x 4' wide.

No. 3 orebody on No. 1 vein: Located by 200' level No. 1 shaft, ore was low grade mill ore. No ore below 200'. Roughly 50' x 50' x 4' wide.

No. 4 orebody on No. 2 vein: Located by 200' level, No. 1 shaft. Ore was good grade mill ore. No ore below 200'. Roughly 200' x 100' x 5' wide.

No. 5 orebody on No. 2 vein: The largest single

orebody yet encountered in the mine. Located by 150' level from No. 3 shaft, when No. 2 vein was discovered. Orebody on 150' level was 340' long, and was stoped upwards about 100'. Ore was high grade mill ore. Developed on 200' level, orebody was 390' long and was stoped to the 150' level. On the 260' level, orebody was 330' long and was stoped to the 200' level. Ore was high grade mill ore. Developed by a winze at 300', orebody was 190' long and was stoped to the 260' level. No ore remains above the 300' level. The orebody continues below the 300' level, 190' long and 8' wide, high grade mill ore. Although highly irregular in outline, the developed portion of the orebody measures roughly 600' x 100' x 8' wide.

No. 6 orebody on No. 1 vein: Located by old No. 2 or mill shaft, and developed by 50 and 100' levels therefrom, ore was gravel and high grade lump. Stoped above 100' level, and pinched below 100'. Roughly 100' x 50' x 8' wide.

No. 7 orebody on No. 4 vein: The most impressive orebody in the mine, due to its great width of high grade mill ore. Located on the 260' level from No. 3 shaft, by diamond drilling to the east. On the 260' level the orebody is 300' long on the property, and averages 12' wide. To the north it continues over into the adjoining property. This orebody does not approach within 150' of the surface. Partially stoped above the 260' level, the developed portion measures roughly 300' x 60' x 12' wide. The orebody continues below the 260' level, and at present is being developed on the 300' level from No. 4 shaft. The ore has been cut on this level by diamond drilling below the 260' level.

No. 8 orebody on No. 1 vein: Located by the 70' level from No. 3 shaft, where the orebody was 250' long. Stoped above the 100' level, the orebody was 175' long. Stoped above the 150' level, the orebody was 160' long. Stoped above the 200' level, it was 70' long. The ore was medium grade mill ore, and does not extend below the 200' level. Roughly 200' x 100' x 5' wide.

No. 9 orebody on No. 3 vein: Located on the 260' level from No. 3 shaft, and stoped upwards about 40'. The ore is notable for its high zinc, sulphide content, and is a medium grade fluorspar mill ore. It continues below the 260' level, where it is 75' long and 5' wide. Developed portion measures roughly 50' x 40' x 4' wide.

No. 10 orebody on No. 1 vein: Located by the 70' level from No. 3 shaft, where the orebody was 150' long. Stoped above the 100' level, it was 190' long, and was medium grade mill ore. Stoped above the 150' level, it was 180' long and was low grade (40% - 50%) mill ore. Not stoped above 200' level due to low grade, the orebody was 100' long. The ore does not continue below 200'. Roughly 250' x 100' x 5' wide.

No. 11 orebody on No. 1 and No. 2 veins: Located by the 260' level from No. 3 shaft, this orebody is 90' long and 10' wide, high grade mill ore. It continues below the 260' level. Developed

portion measures roughly 60' x 40' x 10' wide.

No. 12 orebody on No. 1 vein: Located by shallow shafts at 50', and developed by 100' level. The ore was high grade gravel and soft lump. The developed portion measured 200' x 50' x 10' wide. On the 100' level the ore was rather low grade, and its continuation below 100' is questionable.

ORE RESERVES: In estimating ore reserves present in the mine, distinction is made between developed ore or ore in sight, and probable ore, or ore projected below the bottom level. It is noteworthy that due to common mining practice of immediately stoping developed ore, ore reserve estimates of fluorspar mines do not accurately reflect their true evaluation. More consideration should be given to probable ore, and favorable mineralizing conditions. Past production records are valuable, by proving the presence of commercial orebodies. Probably the most accurate or valuable estimate can be made by a competent, practical geologist actually studying underground conditions and deciding whether in his opinion the orebodies persist in depth, with other recurrent new orebodies to be expected along the faults.

DEVELOPED ORE: There is no developed ore present in the Davenport Mine other than in the new No. 7 orebody on No. 4 vein. All the economic ore above the bottom levels has been stoped. The No. 7 orebody has been stoped above 200', and partially between 260' and 200'. The remaining ore between 260' and 200' is estimated: $\frac{150 \times 40 \times 10}{10}$ or 6000 tons crude ore. However, since this ore is high grade, a mill recovery of 90% can be made: or 6000 x 90% = 5400 tons shipping fluxing fluorspar.

The ore between 300' and 260', as proved by the floor of the 260' level, and diamond drill holes below, is estimated: $\frac{300 \times 20 \times 10}{10}$ or 6000 tons crude ore. At 80% recovery, 6000 x 80% = 4800 tons shipping spar.

Thus the developed ore present in the Davenport Mine is estimated at 10,200 tons shipping spar.

PROBABLE ORE	SHIPPING SPAR
No. 1 (pinched at 200)	None
No. 2 (pinched at 150)	None
No. 3 (pinched at 200)	None
No. 4 (pinched at 200)	None
No. 5 $\frac{190 \times 8 \times 95}{10}$ x 50%	7,200 tons
No. 6 (pinched at 100)	None
No. 7 $\frac{300 \times 10 \times 130}{10}$ x 50%	19,500 tons
No. 8 (pinched at 200)	None
No. 9 $\frac{75 \times 5 \times 35}{10}$ x 50%	660 tons

No. 10 (pinched at 200)		None
No. 11 $\frac{90 \times 10 \times 45}{10} \times 50\%$		2,020 tons
No. 12 (pinched at 100)		None
	Total	29,400 tons

Total Ore Reserves 29,400 plus 10,200 = 39,600 tons shipping spar.

EVALUATION: To evaluate the Davenport Mine, consideration should be given to an appraisal of physical assets, including land, mine and mill buildings, machinery and plant installation, tools and supplies, and the net worth of the mineral production that can be made. No attempt will be made in this report to appraise the physical assets, but reference is made to company records of the National Fluorspar Company.

The Davenport Mine is a going concern, fully equipped for mining. The only additional capital required to continue mining, other than for improvements, would be for additional development work. Since this capital should be absorbed for sustained production, it is considered a part of the cost of production. Estimated cost per ton:

Development		$ 2.00
Diamond Drilling		1.00
Machinery Replacement		1.00
Mining Labor		4.00
Supplies		2.00
Power Plant		1.00
Milling		2.00
Insurance		2.00
Taxes		1.00
Hauling		1.00
Miscellaneous		1.00
	Total	$18.00 per ton

At $30.00 per ton, net profit should be $12.00 per ton. These costs are based on past experience in fluorspar mining, and are in line with costs at similar mines in the district.

On the developed ore, net profit at $12.00 per ton would be $122,400. On the probable ore, assuming 50% recovery of estimated ore reserves, net profit at $12.00 per ton would be $176,400. Thus the net worth of the expected future production is estimated at $298,800.

RECOMMENDATIONS:

Management: The successful operation of a fluorspar mine depends entirely on the character of its management and supervision. Competent engineering advice and geological guidance must be followed. The present manager, B. E. Clement, is the best in the field, and his record stands by itself.

Future Operations: Continue drifiting on the 300' level to develop No. 7 orebody.

Obtain a lease on the adjoining property to the north, and extend this level.

Sink No. 3 shaft to 400' and develop the orebodies in the No. land No. 2 veins.

Obtain an underground diamond drill and keep it drilling. Do not drive any long rock exploratory X-cuts or barren levels ahead of drilling. Always drill below a level before sinking shafts below, and do not sink on negative evidence. Modern mining is a business problem, and should not be guided by wishful thinking.

Lay out a long range program of future operations, to balance development against production.

MILLING: Several improvements are needed in milling. Construct two more jigs, and start jigging at coarser sizes. Construct a flotation plant to treat fines and slimes.

SUMMARY:

The Davenport Mine is a going concern.
Favorably located; accessible, and on a major fault system.
Several veins, intensively mineralized.
Commercial ore deposits.
High average quality of ore.
Large developed tonnage.
Large indicated potential tonnage.
Mine completely equipped.
Ready to go.

OPINION: I am a graduate mining engineer, with ten years' field experience in the Fluorspar District; eight years as Mining Engineer at U.S. Steel's Lafayette Mine; one year as independent producer; and one year as Superintendent of two fluorspar mines. I am completely familiar with the developments and geologic conditions of the Davenport Mine.

In my opinion this property offers a real opportunity for successful investment in a mining venture.

(signed) Avery H. Reed, Jr.
Mining Engineer

Marion, Kentucky
November 7, 1943

April 6, 1946

DAVENPORT MINE REPORT

HISTORICAL DATA RELATIVE TO TONNAGE

and other information

by B. E. Clements

INTRODUCTION

The Davenport Mine is located near Marion, in Crittenden County, Kentucky. It has been operated since 1922 at various intervals-- about two-thirds of the time for the past twenty-four years. The mine has been one of the outstanding producers of the area.

The first eight years after Mr. O. E. Guess and Mr. C. W. Haynes leased the mine, the property had on it very little equipment. There was no mill, no air compressor, and no major shaft construction. Starting in 1934, after the depression, the National Fluorspar Company, who were successors to Haynes and Guess, started operations again and installed a small mill with one jigg. The production amounted to a few thousand tons each year until 1940 when the production reached about six thousand tons.

The mine financed itself except for the assistance of B. E. Clement which was constant over the years. The mine has been one of the consistent money makers of the district.

In this report, an effort is made to approximate the production of the major ore bodies above the main levels on each fault or vein.

As mining was carried on at different levels or depths, and at the same time work was carried on not from one vein but from two veins at a time; it would be impossible to know the exact gross tonnage or net tonnage from a level or a particular vein.

In the early days and up until the war, the market required a high grade ore. This means that dump piles and piles of tailings, which is the waste from milling, contained twenty-five to thirty per cent fluorspar. It was a common practice in the district to throw this away or give it to road repair and road construction.

In this report, the tonnage is figured on a gross mill ore basis. It is estimated the loss in weight from beginning to end at about thirty-five per cent. It is apparent that the gross production has been about one hundred and six thousand tons.

In time gone by, thousands of tons of sand fluorspar have been wasted or sold for about the cost of hauling it away as waste. This sand fluorspar would run from fifty to eighty per cent calcium fluoride, as it came out of the mill, or, was washed away in the creek to get rid of what was called waste. If this had been saved to the present time and floated, it would have had a value of a few hundred thousand dollars.

VEIN NO. ONE
(WEST FAULT)

This vein is along the main foot wall of the Moore Hill Fault, known as the west member. On the Davenport property the distance extends about fifteen hundred feet. On the north end almost on the Eagle line, the No. 2 fault converges with this No. 1 fault. On the south end No. 2 fault again converges about four hundred feet from the south Davenport property line.

The best ore bodies on this fault, as regards width and quality, were above the two hundred foot levels. The work at two hundred foot depth did not show the quality or width shown at one hundred fifty foot depth.

This may be a local situation, however, and at a depth of three hundred feet or below, ore may return in quantity.

Several fine ore bodies have been mined on this vein. It is the estimate of the writer that more than forty thousand tons of high grade mill ore has been produced on this fault on the Davenport area. At least half of this tonnage has been a marvelous quality; in fact, nothing can be found richer than the best of these ore bodies.

On the south end of this fault in the area where vein No. 2 and vein No. 1 have converged, we did anticipate both width of mill ore as well as great quantity not only in the area at the south end but below this area at depths of three hundred, four hundred, or maybe five hundred feet.

VEIN NO. TWO

This vein or fault appears to be the arc of a great circle. Enclosed in this arc is a giant horst. As before stated, this fault converges with No. 1 on the north end of the property and at a point about four hundred feet from the south end of the property. In the central portion of the property is an ore body almost continuous, which was not only ten feet wide for two hundred feet but exceedingly pure. Both walls were sufficiently hard to permit

fill stope mining. Something like twenty-five thousand tons of finished ore were produced at a handsome profit. On this vein the levels at depths of one hundred fifty feet, two hundred feet, and two hundred sixty feet were not driven to the extreme ends of the property. Some work was done at a depth of three hundred feet by sinking a winze in the bottom of the two hundred sixty foot level. A few thousand tons were produced with an underground hoist set north of the No. 3 shaft. The ore in the three hundred foot level was not as pure as the ore mined above; however, the walls were wide and would average more or less twelve feet. This winze was extended below three hundred feet. At a depth of about ten feet (310'), the showing of mill ore was good; in fact, much above the average shown in the three hundred foot level. Dr. Marvin Weller remarked to the writer about two years ago that he would expect to see good ore on this vein at a depth of four or five hundred feet. This does not mean you would have to go to that depth to find good ore, but it was simply a prediction that this fault was a deep structure and that he would expect to see ore as mining extended downward. The gross tonnage from this vein is estimated at twenty-nine thousand one hundred tons which is in all probability too small.

VEIN NO. 3

Fault No. 3 is another relief fault or fracture with apparently a small displacement which emerges from fault No. 2 at a distance of something like five hundred feet from the Eagle line and turns a little to the right of a parallel with fault No. 1, going on to the Watson mine property. The entire distance available for mining on the Davenport is about two hundred feet. The central portion of this vein at a depth of two hundred feet was very fine. It had a width of about six feet. The ore was very high grade. The sand spar was so low in silica, as the said sand spar was really a high grade ore itself. It would commonly run around five per cent silica and eighty per cent calcium fluoride.

The ore from this vein was attractive in more ways than above mentioned. The writer examined hundreds of specimens under U. V. light. The specimens showed fine white parallel lines and these lines were parallel with the horizon. On the south end of this No. 3 fault, it appears to be dipping fast to the No. 2 fault.

As the fault approaches the Watson line on the north, it is almost vertical. No doubt this fault will go a short distance and be united with some other cross fault. It is expected that this vein will not have many great potentialities for the future.

VEIN NO. 4

This fault has a general direction in the center of about thirty-seven degrees east of north. It has a total length on the

property at the surface of about eleven hundred feet.

In the summer of 1941, the National Fluorspar Company drove a crosscut east, looking for an anticipated fault; at a distance out from vein No. 2 of ninety feet, a fault containing much zinc was cut. At this point the width of all was about ten feet. This fault known as the zinc vein had a direction of almost north and south. The ore which was fluorspar, zinc, and iron extended up about forty feet. The most of the tonnage was fluorspar. Some spots contained beautiful zinc sulphide and zinc silicate. The writer in walking through the level at two hundred sixty feet on this vein, observed in looking up overhead in the stopes that ridges appeared which were horizontal, also it was observed at the point where this vein was cut that there was movement north and south on the vein. This suggested that beyond this point, not so far away, there must be another fault to permit a slipping of this huge block of rock between the zinc vein and something to the east beyond.

The writer then directed that we take a crosscut to the left of the vein, the direction that the crosscut was first started. We drove this crosscut over one hundred feet and stopped work here for the time being. At the end of this extended crosscut, however, there appeared a small cave area. Out of this the men shoveled a few barrels of fine fluorspar which was worn round like pebbles. This suggested that beyond somewhere, there was the anticipated fault. This round pebble fluorspar, when put under U. V. light, showed characteristics different from anything observed in the veins to the west.

At this stage of the game, the company gave an option on the mine to a company in the East, who were financially able to core drill or do anything they might wish. The writer insisted that the area to the east, which was the zone of anticipation, be drilled. The company who had the option allowed it to drop and did nothing except to call up the writer over long distance and ask for an extension of time. No time was granted, and this was a forgotten incident.

About a month later the writer rented a core drill and from a point at the east end of this crosscut put out two diamond drill holes. When the drill hole progressed about twenty-five feet, it went into a wonderful ore body which was twenty-one feet wide. This first hole was to the left; so a second hole was drilled turning a bit toward the right at an angle of about thirty degrees. This drill hole likewise cut over twenty feet of fine fluorspar.

Great haste was made then to drive the crosscut on which was a distance of less than fifty feet to this new and wonderful fault structure. In the course of five months, which was over the balance of the year, we had driven each way at a depth of two hundred

sixty feet. Distance of over all about one hundred fifty feet. It was a picture all the way. We made some fine photographs. We cut a raise then one hundred feet high which was in fine ore. It was about two months after we cut the vein that Mr. A. H. Reed, Sr. went in the mine and saw the ore and the fault structure and remarked to the writer that the discovery was worth a hundred thousand dollars. He also made this statement, "This reminds me of the Daisey Mine at Rosiclare."

From the time this vein was cut in June until the end of the year, the ore that came out of the levels or rather we might call it out of development made a profit of nearly forty thousand dollars. It is apparent from an examination of the map that the ore body on the north side of shaft No. 4 was very rich. This ore body extended to the three hundred foot level for a distance of about two hundred feet; however, on the three hundred foot level going north, the ore body was narrow and suggested that the ore might bottom somewhat below three hundred feet in depth.

In 1945, however, the three hundred foot level was extended to the south for a distance of about three hundred feet. In this work and at a distance of nearly two hundred feet south of No. 4 shaft an excellent ore body was encountered. This was almost over and to the south of an excellent ore body at two hundred sixty. The present showing in the bottom of this three hundred foot level on this south end is really a picture to look at. It has a good width of from five to ten feet and is exceedingly pure.

The dip of this fault is about fifty-six degrees. If this dip continues, it would intersect with fault No. 2 at a depth of about five hundred feet. It may intersect at four hundred and fifty. It appears the dip is greater with depth or rather that the vein increases in its flat-like nature. In other words, the present inclination away from the vertical line is about thirty-four degrees.

Going to the south, I would expect this fault to leave the general course of the west vein No. 1 and be a fault that would be almost vertical, leaving the west member of the Moore Hill fault.

About one-half of the area of fault No. 4, this being the south end, is unexplored. No tunnels at any depth have been driven.

The geology map results from a study of structural exposures as well as underground examinations.

The area of the Davenport Mine and the Eagle, joining the Davenport to the north and the Watson Mine area on the east boundary, is a very complicated faulted area. It is, however, one of outstanding mineral centers of the fluorspar area. Vein No. 2 and No. 4 only have been explored and developed at depths of three

hundred feet. Both veins show commercial quantity and quality at three hundred depths.

The displacement of the faults appears to increase as we go from the north end to the south end of the Davenport Mine.

It would be a matter of great geological interest as well as business interest to see mining and exploration below a point where Nos. 1 and 4 converge (four hundred to five hundred feet).

The geology of vein No. 4, especially on the foot wall side is so complicated that at present it has not been worked out. The core drilling in the foot wall of No. 4 at two hundred sixty feet has revealed a fault or a zone of erosion which appears to go in the general direction of the strike of No. 4 vein. Evidence of this is apparent at a distance of sixty feet to the east at a depth of two hundred sixty feet. The writer would expect another fault east of No. 4 fault and by analogy we would expect this to be mineralized.

The discovery of a superior grade of ore on the three hundred foot level south together with a good width suggests that mineralization might go on down to great depth in vein No. 4 and might be continuous to the intersection of fault No. 1 at a depth of more or less five hundred feet.

We would expect the fault structure to be well defined at depths of five hundred or outh thousand feet. The known depths of mineralization can be determined only by exploration and mining.

On the west of the No. 1 fault as one approaches the property from highway U. S. 60, there is a possibility of new ore finds. According to the map of Weller and Sutton, which gives the geology of Crittenden County, the Salem fault crosses the Davenport in this zone which is about twelve hundred feet from U. S. 60 and about nineteen hundred feet west of the Davenport fault No. 1. Between this above-mentioned Salem fault and fault No. 1 there is much evidence of two faults of small displacement. Many of these faults with small displacement, however, have shown rich mineralization and in general such faults produce an exceedingly high grade ore.

The writer became interested in this Moore Hill section in 1930 and employed Mr. A. H. Reed, Sr., who was considered an authority on fluorspar, to prepare a very complete report. This report covers the Davenport Mines area as well as the adjoining properties which are together the heart of a great center of mineralization. A copy of the conclusion of the report of Mr. A. H. Reed, Sr., is enclosed herewith.

The experience of the writer in this area has been profitable and he has no regrets of having mined on the Moore Hill fault structure.

4(c) ENC. III

Report

of

W. D. SHIPTON, GEOLOGIST

April 15, 1946

(Not to be returned)

DAVENPORT MINES

Location

Geographic: The Davenport Mines of the National Fluorspar Company are located about six miles southwest of Marion and about two and one-half miles east of Salem, in Cuttenden County, Kentucky. The mines are approximately one mile south of U. S. Highway 60.

Geologic: The Davenport Mines are located in the Illinois-Kentucky fluorspar district, an area of approximately 600 square miles along the Ohio River in southern Illinois and western Kentucky. This area is extensively faulted by steeply inclined normal faults with varying displacements, occasionally as much as 1000 feet. Specifically the Davenport Mines are located on Fault number 71 and in the Moore Hill Fault System. This is a proved mineralized area. The Illinois-Kentucky district produces more than 90 per cent of the fluorspar mined in the United States.

Origin and Occurrence of the Ore

The origin of the fluorspar is directly connected with igneous activity. The occurrence of the ore is directly associated with fault fissures. From the underlying molten masses, which intruded the area, solutions rich in fluorine arose along the fault fissures. The fluorine either replaced caleite, which partially filled the fissures, or replaced limestone, which formed the wall rock of the faults, by fluorspar. In some instances fluorspar was deposited directly from the solutions. Thus the veins of greatest economic importance are true fault fissure veins. Further, the greatest ore concentrations are where the wall rock of the faults is limestone of the Ste. Genevieve and St. Louis formations of Mississippian age. Since the fault fissures have variable widths, even pinching out entirely in some cases, the ore bodies are not continuous, either horizontally or vertically, and hence, occur as lenticular masses.

Uses of the Ore

Between 70 to 80 per cent of the fluorspar produced is used in the open-hearth steel furnaces. Besides being used in other metallurgical processes, it is also used in the chemical industry, such as in the manufacture of hydrofluoric acid, and in the ceramic industry, in various glasses and enamels. Whether the chemical advances necessitated by the World War will increase the uses of fluorspar cannot be seen at this time. A small amount is used for optical purposes. Small amounts are also used for various miscellaneous purposes.

History of the Davenport Mines

The history of the Davenport Mines is fully outlined in a report by Avery H. Reed, Consulting Engineer and Geologist, and is, therefore, not repeated in this report.

Davenport Mines Property

The Davenport Mines property consists of 120 acres of mineral rights and 26 acres of surface in the vicinity of the mine plant. The property line extends approximately 1500 feet from northeast to southwest and ..... feet from northwest to southeast. The Moore Hill Fault System traverses the property from northeast to southwest. This system on the property is composed of four known faults with the possibility of at least one additional fault which may be mineralized. The four faults are known as fault or vein number one, fault or vein number two, fault or vein number three, and fault or vein number four. Fault number one is a continuous fracture traversing the property from northeast to southwest along the western boundary and is number 71 of the Moore Hill Fault System. This fault is usually designated as the west member of the Moore Hill fault zone. Faults number two, three, and four are divergent faults from fault number one. Fault number one was undoubtedly the deep seated fissure which was the channel of access for the igneous solutions and which solutions were deflected into the fissures of faults numbers two, three, and four.

Fault number one is almost vertical with perhaps a slight dip to the east. It has a vertical displacement of about 250 feet, having at the surface the Ste. Genevieve limestone on the west and the Bethel sandstone on the east side. The total distance of the fault available for mining is about 1500 feet.

Fault number two forms an arc intersecting fault number one at the north property line and at about 400 feet from the south property line. Enclosed by these two faults is a long, narrow, wedge-shaped horst block. This fault is also almost vertical with a slight dip to the east. It has a vertical displacement of about 100 feet, having at the surface the Bethel sandstone on the west and the Cypress sandstone on the east side. The total distance available for mining is about 1100 feet.

Fault number three is a short cross fault connecting number two and probably number four faults. The vertical displacement is about 50 feet. The total distance available for mining is approximately 200 feet.

Number four fault is located along the eastern boundary of the property. It dips to the west at an angle of about 47 degrees and should intersect fault number two at a depth of between 450 and

and 500 feet. It has a vertical displacement of about 200 feet, having at the surface the Cypress sandstone on the west and probably the Renault limestone on the east side. The total distance available for mining is about 1100 feet.

Estimated Ore Produced

The total ore produced since the mine was first operated in 1922 is estimated as follows:

Fault number one										
100	foot	level	and	stopes--distance	1380	feet-	26100	tons		
200	"	"	"	"	1230	"	13850	"		
260	"	"	"	"	300	"	3600	"		
							43550	"	43550	tons
Fault number two										
150	"	"	"	"	300	"	3600	"		
200	"	"	"	"	550	"	12000	"		
260	"	"	"	"	500	"	10500	"		
300	"	"	"	"	400	"	3000	"		
							29100	"	29100	tons
							Carry over		72650	tons
Fault number three										
100	"	"	"	"	150	"	900	"		
200	"	"	"	"	250	"	6000	"		
							6900		6900	tons
Fault number four										
260	"	"	"	"	550	"	19000	"		
300	"	"	"	"	600	"	8160	"		
							27160		27160	tons
							Grand Total		106700	tons

In considering the total tonnage of ore produced in the Davenport Mines, it must be understood that the mines have not been in continuous operation since first operated in 1922. Rather, the mines have been operated only at intervals during the past twenty-four years with most of the operation being in the past six years. The production amounted to only a few thousand tons each year until 1940 when the production amounted to about six thousand tons. Further, the mines were not equipped to handle any large production until recent years. As late as 1934 the mines had only a small mill with one jig. Because of poor and insufficient equipment and uneconomical methods of mining, much low grade fluorspar ore was discarded as waste. While no accurate record of the low grade ore discarded has been kept, nevertheless it is safe to say it would

have had a value of a few hundred thousand dollars. The above statements clearly indicate that the total tonnage of fluorspar produced from the Davenport Mines does not indicate the real value of the mines.

Ore Reserves

Since the ore bodies occur as lenticular masses localized and confined within the fault fissures any statement of probable ore reserves would be based upon insufficient evidence. Nevertheless, it is possible to form a sane opinion of possible reserves on the basis of geologic evidence. It has previously been stated that ore bodies of greatest economic value are found where the wall rock of the fault fissures is limestone of either the Ste. Genevieve or St. Louis geologic age. It is upon this basis that the estimate of the fluorspar reserves in the Davenport Mines is made. The total thickness of the Ste. Genevieve formation is approximately 240 feet and the total thickness of the St. Louis formation is approximately 350 feet. Further, an estimate of possible ore bodies on unexplored portions of the 100, 200, 260, and 300 foot levels in faults numbers one, two three, and four is made on the basis of ore already produced.

In fault number one there is an unexplored distance of approximately 300 feet on the 200 foot level, approximately 1000 feet on the 260 foot level, and approximately 1500 feet on the 300 foot level. On the basis of ore already produced these unexplored distances should produce an additional 32,170 tons. The 300 foot level is approximately the contact of the Ste. Genevieve and the St. Louis formations on the downthrow side of the fault. This would mean an additional 350 feet of St. Louis limestone forming the wall rock of the fault fissure. This would mean a possible future production of about 85,000 tons. From unexplored distances on levels already driven and from future levels to be driven, fault number one should have a reserve of some 117,170 tons of fluorspar.

Fault number two has an unexplored distance of approximately 400 feet on each of the 150, 200, 260, and 300 foot levels. On the basis of ore already produced, these unexplored distances should produce an additional 35,070 tons. The 300 foot level is approximately the contact of the Ste. Genevieve and the Renault formations on the downthrow side of the fault. This would mean an additional 240 feet of St. Louis or 590 feet of limestone forming the wall rock of the fault fissure. This would mean a possible future production of about 126,260 tons. From unexplored distances on levels already driven and from future levels to be driven fault number two should have a reserve of some 151,330 tons of fluorspar.

Fault number three is a short divergent fault from the number two fault. It has a distance of about 200 feet available for

mining and has a small vertical displacement, possibly less than 50 feet. While a total of 6,900 tons of ore have been produced from this fissure and while there will be additional tons produced, nevertheless, it is thought that the additional tons will not be sufficient to warrant consideration in estimating the ore reserves.

Fault number four has an unexplored distance of 1,100 feet on the 100 foot level, approximately 100 feet on the 200 foot level, 550 feet on the 260 foot level, and 500 feet on the 300 foot level. On the basis of ore already produced these unexplored distances should produce an additional 25,750 tons. The 300 foot level is approximately the contact of the Renault and the Ste. Genevieve formations on the downthrow side of the fault. However, the dip of this fault is such that the fault will probably intersect fault number two at a depth of about 500 feet. However, from the 300 foot level to the 500 foot depth, the wall rock of the fault fissure will be Ste. Genevieve on the downthrow side and St. Louis on the upthrow side, a condition extremely favorable for mineralization. On the basis of the actual and possible ore production from the 260 and 300 foot levels, the additional 200 feet of levels would mean a possible future production of about 70,600 tons. If the angle of dip should increase and fault number four intersect fault number two at a lower depth than 500 feet then the number of tons of ore reserves would appreciably increase. Further, at the intersection of fault number four with fault number two an enrichment of ore is a potential possibility. From unexplored distances on levels already driven and from future levels to be driven, fault number four should have a reserve of some 96,350 tons of fluorspar.

Tabulation of Ore Reserves

Fault number one

Level	Explored	Tonnage	Unexplored	Tonnage
100'	1,380'	26,100	100'	
200'	1,230'	13,850	250'	2,770
260'	300'	3,600	1,180'	14,400
300'	---	---	1,480'	15,000
		43,550		32,170
		32,170		
		75,720		
350' (Additional levels in St. Louis limestone)		85,000		85,000
		Possible Reserves		117,170

Fault number two

Level	Explored	Tonnage	Unexplored	Tonnage
150 '	300 '	3,600	400 '	4,800
200 '	350 '	12,000	530 '	11,660
260 '	500 '	10,500	580 '	12,760
300 '	400 '	3,000	780 '	5,850
		29,100		35,070
		35,070		
		64,170		
590 ' (Additional levels in Ste. Genevieve and St. Louis limestone)		126,260		126,260
			Possible Reserves	151,330

Fault number four

Level	Explored	Tonnage	Unexplored	Tonnage
100 '	---	---	1,100 '	---
200 '	1,000 '	---	100 '	---
260 '	550 '	19,000	550 '	19,000
300 '	600 '	8,160	500 '	6,750
		27,160		25,750
		25,750		
		52,910		
200 ' (Additional levels in Ste. Genevieve and St. Louis limestones		70,600		70,600
			Possible Reserves	96,350

GRAND TOTAL 364,850

There is the further possibility that the major fault fissures, such as fault number one may be mineralized below the St. Louis formation an additional 800 feet to the Chattanooga shale of Devonian age. In this 800 feet the wall rock of the fissure would consist in large part of limestone of Spergen and Warsaw formations of the Meramec Group and limestone formations of the Osage Group.

There is also the possibility of one or more additional faults which it would be expected would be mineralized.

As has been pointed out more economical methods of mining than those used in earlier years would prevent considerable waste of low grade ore. Also more economical methods of handling high grade ore than those used at the present time, would effect a considerable saving in cost per ton.

Galena, sulphide of lead, is a valuable by-product in milling.

The price per ton of the ore depends largely upon the variations in the steel industry and while the fluctuations in that industry cannot be predicted there is the strong probability that the next few years may witness considerable activity and that the price may be higher than at the present time. This would naturally mean an increase in profits.

It has been pointed out that by the nature of occurrence of the ore bodies that any statement of possible reserve of ore is based upon intangible evidence. The estimate of reserve of 92,990 tons from unexplored distances on levels already driven may be entirely too large since it would seem as if these distances would have been driven if thought to be productive. It is certainly safe to assume however, that these distances will produce a considerable tonnage of ore. If mineralization does not continue at lower levels at a comparable relation to those levels already driven then the figure of 281,860 tons is too high. Assuming that only 50 per cent of the estimated number of tons would be produced, the profits would still be substantial.

The Davenport Mines are in a proved mineralized area and it is safe to say that the Davenport Mines still have a considerable reserve of fluorspar ore and will continue to be a major producing mine in the area.

The statistical data on the Davenport Mines used in this report has been supplied by Mr. B. E. Clement, Marion, Kentucky, and the writer wishes to acknowledge appreciation of his assistance.

W. D. Shipton
Geologist

April 15, 1946

4(c) ENC. IV

REPORT OF INVESTIGATIONS

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

EXPLORATION FOR FLUORITE
CRITTENDEN AND LIVINGSTON COUNTIES, KENTUCKY

Fluorite was noted as early as 1818 near Shawneetown in southern Illinois. In 1835 an attempt was made to work deposits in Crittenden County, Kentucky, but interest centered chiefly upon the galena found with the fluorite. The first shipments of fluorspar from Kentucky were made in 1873 from the Yandell mine of Crittenden County. It is not known when the first work on the Moore Hill fault was done, but it seems probable that the Cullen-Eagle and Nancy Hanks were being worked in 1900. Gravel spar was found on the surface at the Two Brothers mine in 1904, and the main shaft was started in 1914; work also began at the Davenport in 1914, and in 1917 the Eagle-Watson was in production. A shaft was sunk on the Pepperbox in 1918, and in 1922 fluorspar was found and work was started on the Summers property. In 1924 work began at the McCune, Felix Tyner, Eagle-Wring, and probably the Hicks properties.

No good approximate record of production from each property on the Moore Hill fault system is obtainable, but an estimate based upon all data available is as follows:

Mine	Short tons	Remarks
Sisco	None	
Summers	11,500	Metallurgical-grade concentrate.
Pepperbox	2,400	Crude Ore.
McCune	-	Very small production; no figures available.
L. E. Waddell	6,500	Authority, Mrs. O.S. Denny; may not include all production
Eagle-Watson	200,000	No exact record; estimate by L.F. Hearne; concentrate from gravel spar from shallow depth.
Two Brothers	60,000	Estimates vary from 30,000 to 200,000 tons; from residual fluorspar.
Davenport	55,000	Fluxing spar concentrate, estimated
Hicks	5,000	Crude ore
Felix Tyner	None	
Jess Tyner	600	Crude ore
Eagle-Wring	2,500	90 percent log-washer concentrate
Grimes	2,000	Log-washer product from gravel spar
Cullen	500	
Nancy Hanks	75,400	Log-washer product from gravel spar.
	421,400	

PHYSICAL FEATURES AND COMMUNICATIONS

The topography of the area is one of moderate relief, with elevations ranging from 400 to 600 feet above sea level. The area is drained by Dry Creek, a southwesterly flowing tributary of the Cumberland River.

The properties are southwest from Marion, Ky., and extend from the Sisco property, about 5-1/2 miles from Marion, to the Bennett property, about 9-1/2 miles from Marion. These are air-line distances. U. S. Highway 60 is 1 to 1-1/2 miles east of the properties. The principal mines are connected to the highway by good graveled roads. The Illinois Central Railway has a freight station in Marion, which is a town of about 2,000 population.

The climate permits working throughout the year. Spring rains cause surface water to enter mine workings, which often seriously interferes with production.

ORE DEPOSITS

The Moore Hill fault is shown on the areal and structural map of Crittenden County as extending from Livingston Chapel in Livingston County northeastward for 25.8 miles to the east edge of the Cave-in-Rock quadrangle in Crittenden County. The productive portion of the fault shown in figures 2 and 3 is about 4 miles long. It is this portion of the fault that is the subject of the present report.

On the county map is shown Fault 72, which, in the productive portion of the Moore Hill fault, is very roughly parallel to Moore Hill and about 300 to 900 feet east of it. There are a number of relief faults between these major faults. Fault 72 has not been prospected. All the mines except one are in the Moore Hill fault zone. The exception is the Two Brothers mine, which is on a relief fault shown on figure 10. Also, a possible exception is the ore in Fault 10 of the Davenport.

Within the productive length, the Moore Hill fault strikes N. 40° to 50° E. and dips 75° to 90° southeast. "The displacement along the fault ranges from a minimum of about 150 feet on the Sisco property near the north eastern end of the area to a maximum of about 550 feet between the Felix Tyner and Grimes properties. In the area southwest of the Grimes property, the displacement ranges from 200 to 300 feet. The downthrow is to the southeast throughout the length of the fault."

The country rock is the Mississippian system of sedimentary rocks, consisting of limestones, shales, and sandstones. The formations are of the Chester Series below the Glen Dean, including the Hardinsburg, Golconda, Cypress, Paint Creek, Bethel, and Renault, and the Ste. Genevieve of the Iowa Series, including the Levias, Rosiclare, Fredonia, and St. Louis. Near the surface the footwall rock is Ste. Genevieve and the hanging-wall rock is Chester.

The ore is in irregular shoots within the faulted zone, and most of it is found in the Ste. Genevieve limestone as fissure filling and replacement of fault breccia. Much of the ore mined was residual, locally called "gravel spar." This is found at the surface and in places extends to more than 100 feet in depth.

Ore shoots, where composed of solid rock, are 3 to 20 feet wide, but gravel spar deposits are much wider, in places ranging up to about 40 feet. The length of known ore shoots is a few feet to 400 feet. The greatest depth at which ore has been found beneath the surface is about 300 feet, but there is no known geological reason why ore should not exist at greater depth.

Geological criteria for determining the locations of ore shoots within the faulted zone are lacking.

Ordinarily the overburden of soil, boulders, and gravel is 10 to 40 feet thick. This is a considerable handicap to prospecting.

The economic minerals are fluorite, sphalerite, and galena. The principal gangue material is massive calcite. Subordinate vein minerals include barite, quartz, and marcasite or pyrite.

DAVENPORT PROPERTY

The Davenport property is in Crittenden County, Kentucky, about 7-1/2 miles southwest of Marion.

The property was originally a farm owned by Mont Davanport. Fluorspar was discovered during the first World War by two prospectors, Bellamy and Arnold, at a depth of about 25 feet near the present location of shaft No. 1.

Haynes and Guess leased the mineral rights in 1921 and started mining operations on the property in 1924. They sank two shafts about 150 feet and produced about 7,000 tons of excellent-grade ore. Most of this ore came from depths not exceeding 100 feet.

In 1929 Haynes and Guess subleased to Roberts and Frazer. This lease was in effect for less than a year, and about 800 tons was produced.

In 1930 Guess entered into a contract with B. E. Clements, whereby Clements eventually became owner of the half interest formerly owned by Guess. In 1930, Haynes and Clements sank the main shaft, a two-compartment shaft, to a depth of 200 feet. Ore produced in 1931 and 1932 totaled 2,186 tons. Then operations ceased until April 1934. In 1934 one jig was set up and the mill was added to from time to time until 1939, when the present jig-mill layout was completed.

The No. 3 shaft was sunk to 200 feet in 1935 and was deepened to 260 feet in 1938.

The No. 4 shaft was sunk in 1942-43 to a depth of 300 feet. In June 1942 diamond drilling from the 260-foot level cut fault 10 and discovered the excellent ore body now (1944) being mined.

Production from 1930 to December 1, 1944, was 47,115 tons of concentrate.

Davenport production record

	Short tons	Remarks
1924-1929	7,000	Crude ore
1929-1930	800	Do.
1931	1,386	Net milled weight as shipped except a small tonnage of high-grade lump
1932	801	
1933	415	Net milled weight
1934	541	Do.
1935	1,752	Do.
1936	4,731	Do.
1937	4,663	Do.
1938	1,691	Do.
1939	3,747	Do.
1940	6,715	Do.
1941	6,788	Do.
1942	5,835	Do.
1943	4,768	Do.
1944 to Dec. 1	3,282	Do.
Total	54,915	

Three principal veins have been mined (figs. 9 and 11). Ore shoots are fissure filling and replacement of brecciated rock within the faulted zones. Fluorite is the principal ore mineral, and sphalerite and galena are present in small quantities.

Fault 1 is the Moore Hill fault and fault 11 splits off from fault 1 at a point about 900 feet southwest from the main shaft and rejoins fault 1, at about 200 feet northeast of the main shaft, as shown on figure 11. Faults 1 and 11 are nearly vertical.

The No. 1 vein is in the fault 1 zone. The first mining on the property was in this vein within the area northeast of the main shaft, shown on figure 9. This work was from the surface to a depth of 150 feet. Later, the vein was mined to a depth of 200 feet through the main, No. 2, and No. 3 shafts. A little work was done on the 260-foot level, and a small tonnage mined below the 200-foot level. No ore was found in the 260-foot level drives on vein 1.

The No. 2 vein is in the fault 11 zone. Ore shoots of the No. 2 vein were mined down to the 260-foot level. Rock containing enough fluorite to be considered low-grade milling ore showed in the bottom of the 260-foot level. This ore is reported to have a width of 10 to 12 feet. The section is about 480 feet long. Also, on the 260-foot section C-D, about 165 feet long, is reported to show a somewhat better grade of ore in the floor.

Fault 10 is a cross fault between faults 4 and 1. It dips 55° to the northwest. Within this fault zone is vein 10.

High-grade ore had been mined in section E-F of vein 10 from the 160-foot level to 20 feet above the 300-foot level. Section E-F is about 270 feet long on the 260 foot-level and was stoped 10 to 20 feet wide and probably averaged about 14 feet wide above the 260-foot level, This ore shoot continues down into section J-K on the 300-foot level. Section J-K is approximately 70 feet long, and the ore is 3 to 4 feet wide.

A drift is being driven on vein 10, southwest of section E-F on the 260-foot level. The face of this drift was in ore on March 10, 1945. Here section G-H, about 150 feet in length, is in ore said to be 10 to 14 feet wide. On the 200-foot level in this section ore one foot wide showed in the floor.

The operators plan to continue the 260-foot level southwest and to drive southwest on the 300-foot level. From this latter drift they plan to core-drill through vein 2, prospecting it beneath the 260-foot level.

The Bureau of Mines did not sample any part of the mine, and only a very small portion of the workings was accessible for inspection. The information as to the ore and the plans of the management was obtained from B. E. Clements, manager of the operating company.

The property has an exceptionally good mine plant, consisting of steam plant (370-horsepower boilers), compressor with capacity of 880 cubic feet of free air a minute, two hoisting plants capable of hoisting from a depth of 400 feet, one new Pomona pump with capacity of 600 g.p.m. against a 300-foot head (powered by a caterpillar Diesel), small but practical blacksmith shop containing drill sharpener and a acetylene-welding outfit, first-aid room and outfit, and a change house. Hoisting is done in buckets.

The milling plant is a simple jig mill that handles 25 tons of ore a day. It does not include a flotation unit. Most of the mill product is sold directly to the consumer but a small portion is trucked to Marion and sold to local mills.

Exploration by the Bureau of Mines

Drilling on the Davenport property began September 26, 1944, and continued until two holes totaling 907.3 feet were completed on October 31, 1944.

The locations of the holes drilled are shown on figure 11 and other drilling data are given in table 6.

TABLE 6

Hole	Coordinates North	Coordinates East	Elevation, ft.	Bearing	Inclination	Total length, ft.	Horiz. Projec. ft.	Vert. depth, ft.
80	9165	9432	492	S.61½° E.	-50°	452.3	291	347
83	8912	9312	480	S.61° E.	-50°	455.0	293	349

Ore was found in fault 10 on the 260-foot level in the Davenport mine, and two holes were drilled by the Bureau of Mines to explore the fault zone southwest of that ore. Drilling proved that the fault continued, but at the points where it was cut by the drill holes no ore was found. The faulted zone was narrow and contained only traces of fluorite and sphalerite.

Hole 80 cut fault 10 at a depth of 319 feet below the collar of the hole at an elevation of 173 feet. The fault was represented by a cavity less than 1 foot wide, which was partly filled with mud. Traces of fluorite were on the walls of the cavity.

Hole 83 cut fault 10 at a depth of 342 feet and elevation of 138 feet. The fault zone was represented by a 7-foot cavity. Only traces of fluorite were found by this hole.

The elevation of the 300-foot mine level is about 150 feet. Hole 80 cut the fault 23 feet above this elevation, and hole 83 cut the fault 12 feet below it.

LOGS OF DRILL HOLES ON MOORE HILL FAULT

Hole 8:

Depth, feet From-	To-		Formation
0	2	Overburden	Bethel
2	6	Sandstone	Bethel
6	120	Limestone and shale	Renault
120	131	Sandstone, calcareous	Rosicalare
131	280	Limestone, in part oolitic and containing sandy and shaly phases; sub-Rosiclare	Fredonia
280	300	Fault zone; very slight quantity of fluorite brecciated limestone, calcite	Fredonia
300	340	Limestone	Fredonia
340	345	Fault; limestone breccia	
345	405	Limestone; few traces of fluorite	St. Louis

			Sample recovery, percent	Analysis, percent CaF_2	SiO_2	$CaCO_3$
21	70	Sand	*	1.08	16.31	68.52
292.8	294	Core	100	2.30	10.00	71.43

Hole 9:

Depth, feet From-	To-		Formation
0	30	Overburden, dirt and boulders	
30	63	Limestone and dark-colored shale, fossiliferous, small fault at 63 feet.	Renault
63	73	Sandstone, fractured limestone, fluorite	Rosiclare
73	103	Limestone, oolitic; trace of fluorite	Fredonia
103	105.7	Limestone, breccia, fluorite	
105.7	316	Limestone, calcareous shale lenses	Fredonia
316	345	Limestone, cherty	St. Louis
345	385	Fault zone, brecciated; traces of fluorite and sphalerite	
385	438.5	Limestone, cherty; scant traces of fluorite	St. Louis

			Sample recovery, percent	Analysis, percent CaF_2	SiO_2	$CaCO_3$
64	76.2	Core	56	25.60	50.22	19.52
103	105.3	Core	70	23.60	7.88	65.04
156	156.7	Core	94	9.24	19.20	61.88
350	371	Sand	*	2.73	63.90	11.40

*Sand that ran into hole and was recovered.

Davenport Property

Hole 80:

Depth, feet From-	to-		Formation
0	6	Overburden, dirt and gravel	
6	117	Sandstone, mud and shale	Cypress
117	123	Shale, sandy	Paint Creek
123	232.8	Sandstone and dark gray, sandy shales	Bethel
232.8	363	Limestone, argillaceous, and shale	Renault
363	368	Limestone, traces of fluorite and sphalerite	Levias
368	373.5	Limestone, sandy, small quantity of fluorite and sphalerite	Rosiclare
373.5	414	Limestone, in part oolitic	Fredonia
414	415	Fault, cavity, partly filled with mud, traces of fluorite on walls of cavity	
415	452.3	Limestone, cherty	St. Louis

		Sample recovery, percent		Analysis, percent CaF_2	Zn
368	371	Core	95	6.36	1.30

Hole 83:

Depth, feet From-	to-		Formation
0	12	Overburden, dirt	
12	127	Sandstone, mud, and shale	Cypress
127	141	Shale, fractured	Paint Creek
141	257.5	Sandstone and shale with numerous thin partings of calcareous sandstone	Bethel
257.5	350	Limestone and shale; traces of fluorite on fracture planes in limestone from 312 to 320 feet; fossiliferous	Renault
350	440	Limestone, in part oolitic; cavities at 367.0 to 371.0 feet, 384.0 to 392.6 feet, 393.3 to 403.5 feet, 421.0 to 422.5 feet, 423.5 to 432.0 feet, 433.0 to 435.0 feet; mud cores at 382.0 to 384.0 feet, 405.0 to 407.0 feet	Fredonia
440	447	Fault, cavity	
447	455	Limestone, dense, fine-grained.	St. Louis

		Sample recovery, percent	Analysis, percent CaF_2
405	407	Mud from cavity	2.96

4(c) ENC. V

C O P Y

October 16, 1951 J51358

Telephone -
Joplin 7161

Please reply to -
405 Miners Bank Bldg.
Joplin, Missouri

Mr. Fred Pfunder
Box 126
Highland, Illinois

Dear Mr. Pfunder:

Please find enclosed a report on the examination of new development at 350' level at Davenport Mine as of October 11, 1951, which has been prepared by J. H. Minshall.

This report as you understand is not an examination of the mine but a brief examination of the development work that has been done by the present operators in the recent months.

We are pleased to have been able to perform this service for you and trust that you will find it satisfactory.

Very truly yours,

Philip L. Jones
Vice-President

THE SINK AND FLOAT CORPORATION

REPORT ON EXAMINATION OF NEW DEVELOPMENT 350' LEVEL AT DAVENPORT MINES, INC., MARION, KENTUCKY

October 11, 1951

by

J. H. Minshall, B. S.
Mining Engineer

October 16, 1951

REPORT ON EXAMINATION OF NEW DEVELOPMENT 350' LEVEL

AT DAVENPORT MINES, INC., MARION, KENTUCKY

As of October 11, 1951

On the 10th and 11th of October, 1951, I examined the Davenport Mine as instructed.

In our conversation on October 9, 1951, you asked for answers to the following questions:

1. Has shaft #4 been sunk to the 350' level?

2. Is shaft #3 in workable condition?

3. What is the condition of the mill?

4. Who is buying the ore from the present operators and are they getting a fair price?

5. How much development work has been done and how much tonnage of ore has been developed?

Answers:

1. Shaft #4 has been sunk to the 360' level. However, they are mining on the 350' level and have a 10 foot sump in the shaft. The shaft seems to be in good repair. There is a tendency for the cans to bump on the downward trip. The mine foreman said that was due to the settling of the head frame. I saw no evidences of buckling in the shaft.

2. Shaft #3 does need some repairs.
   (a) The south side of shaft is slightly buckled near the top.
   (b) Some of the cribbing appears to be rotten.
   (c) Since I had no way to ascertain conditions below which my light would shine I do not know the condition nearer the bottom.

3. The mill could use some repairs. The jaws on the primary crusher are worn and allow some large rock through.
   The swing jaw shaft on the secondary crusher is running hot as they are directing a stream of water over it.
   The conveyor from the secondary crusher is badly worn and allows rock to fall off.
   The Sink-Float plant is running and is taking care of all the ore mined: I estimated at the time I saw it about 15 tons per hour feed to preparation screen and about 3-1/2 tons per hour sink, and 6 tons per hour float.

3. (cont'd.)
The jigs are running and seem to be performing satisfactory.
The flotation plant is down and I don't believe it has run for a considerable time.

4. I asked how they sell their ore and they said that a local dealer was buying all the ore they could possibly mine. They are receiving $60.00 per ton for 100% effective.

5. I made a Brunton survey of the 350' level with the following results;
Map No. 1 shows plan of the development on the 350' level; map No. 2 shows cross section with veins extending downward at the same dip as at the 350' level; sketch No. 3 shows an extension of the ore developed in the No. 3 and No. 4 veins at the 350' level; and sketch No. 4 shows the development of the No. 2 vein on the same level. From the last two sketches it is to be seen that the total pay ore developed is 9,388 tons at 42.3% CaF_2. This is taking in all ore in the vein between the limits shown. This has been accepted in view of the existing Sink-Float plant on the surface which probably can handle this grade of ore satisfactory including a reasonable amount of dilution due to mining.
Development on No. 2 vein on this level has not shown pay ore as can be seen from sketch No. 4. Exhibit #5 shows the assay report on this work. The sampling possible was limited by the physical condition of the cross cuts as follows:
(a) In drift #4 and #3 - timbering and spiling were placed in such a way to hinder sampling. Thus the samples were taken where it was possible to reach the back.
(b) In drift #2 North and drift #2 South, it could be seen by visual examination that the ore was well below minable grade.
The 300' level has been bulkheaded and I could not enter this level to make an examination.
The cross cuts and drifts on this development work have been put through on an average 7 feet wide and 8 feet high. However in many places rough timber brings the clearance height a little below 6 feet.

J. H. Minshall, B. S.
Mining Engineer

C O P Y

THE BRUCE WILLIAMS LABORATORIES

		Calcium Fluorspar
597484	Back Sample #1-#4 Vein	20.75
597485	Back Sample #2-North 30' from beg. of drft.	7.80
597486	Back Sample #2-South 38' from beg. of drft.	8.49
597487	#3 Cross vein in raise	27.57
597488	#2 Vein North Face	8.35
597489	#2 Vein South Face	3.62
597490	#4 Vein Face	33.69
597491	Back Sample 33' from beg. of drft. on #3 vein	44.83
597492	#4 Vein back sample 160' from beginning	73.79

[illegible]

[illegible] 370 [illegible]

[illegible] - [illegible], [illegible]

BY

[illegible]

[illegible] - [illegible]

[illegible] 1950

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Section I Summary and Recommendations

Unfavorable factors:

1. Legal actions now pending between Fred J. Munder, stockholder and former manager, and the other stockholders (applicants).

2. Lack of technical training in the organization.

3. Lack of measured ore reserves.

Favorable factors:

1. Adequate surface plant.

2. P.F.T. estimate of probable (indicated) ore.

3. Ample market for metallurgical grade fluorspar.

4. Present favorable price for fluorspar.

Recommendations:

If the applicant can dispose of the legal difficulties and will obtain and follow competent technical advice, the requested loan could effect a production of 5,000 to 10,000 tons a year of metallurgical grade fluorspar.

Section II Introduction

The Transport Mine was flooded with water during the period of the examiner's visit to Marion, Ky., March 16th to 21st. Heavy rains flooded the mine and drowned one of the pumps about the middle of February 1952. Harry J. Lepper, U.S.B.M., when advised of this condition, cancelled his scheduled visit as he felt he could make no evaluation of ore reserves without going underground. S. A. Feitler, U.S.B.M., collected the material in the field and from the files of the E.F.C. The report was written at College Park, Maryland by S. A. Feitler, Mining Engineer, Bureau of Mines. All the individuals and companies interviewed gave helpful cooperation.

Section III Main purpose of the examination

Recent Development

Verbal statements of the mine superintendent concerning recent development work appear credible. He reports that the No. 4 shaft has been sunk 50 feet passing through Vein No. 4 (not ore) into the footwall. A crosscut was driven 53 feet west toward Vein No. 2. The crosscut went through Vein No. 4 which extended 20 feet along the crosscut (not ore). 20 feet of drift was driven to the south toward probable ore on Vein No. 4.

Ore Reserves

Because the mine workings were inaccessible, ore reserves could not be estimated. The mine was examined by the R.F.C. in 1947 (loan approved but not used) and again in 1950 (loan refused).

In the R.F.C. report (1947) the R.F.C. examiners estimated probable reserves of finished ore (concentrates - 65% CaF_2) as follows:

Between the 300 ft. and 375 ft. levels*

Location	Short tons
Vein No. 1	1,300
Vein No. 2	10,000
Vein No. 4	8,000
Total	19,300

*Reserves estimated above the 300 ft. level are assumed to have been mined since the R.F.C. examination.

The R.F.C. estimates are based on a 75 foot lift below the 300 foot level. The 350 foot level just started by the applicant will effect a 50 foot lift below the 300 foot level and consequently a higher cost per ton for development.

The assays used by the R.F.C. examiners were evidently obtained from samples submitted for analysis by Mr. Charles E. Reed. He is probably the brother of Mr. Avery H. Reed, Jr., mining consultant, formerly of Marion, Ky. (See Exhibit A) The assay map and a notebook in the R.F.C. files indicate that a number of check samples were cut, but no assay results for these samples were found in the files.

History of production

Since production has some bearing on the evaluation of future possibilities, the following is included as the best information available to this time.

	Concentrates Short Tons
Production to 1945	55,000
Probable production of concentrates by present company 1945 - 1947 based on 500,000 of sales	20,000
Production from waste dumps after 1947. 285,000 realized from concentrates selling for $12 to $25 per ton equivalent to 60% effective SiO_2	3,500
Total	78,500

Surface plant

The surface plant appears to be adequate, although certain improvements are needed. All stationary equipment is electrically powered. (The steam plant has been removed.) The applicants plan to install a larger compressor and build a transfer bin at No. 4 shaft so the ore can be loaded directly into trucks without having to be lifted from the ground.

The mill flow-sheet follows current practice in the district. A Huntington-Heberlein heavy media unit is used to concentrate the plus 1/8 inch material. Minus 1/8 inch material is treated in a 6-cell jig. The P.F.A. examiner rated the mill at 120 tons per 8-hour shift. As only waste dumps have been treated in this mill to date, the rate of feed may have to be less than 16 tons per hour to effect good recovery on ore from the mine.

Section IV Additional information requested by Coordinating Committee

1. "For what specific purpose would a $40,000.00 loan be used.....?"

The applicants propose to use the money for mine development and the purchase of a compressor, pump, and miscellaneous mine equipment. (For details see Exhibits E and I-1).

The proposed development work should develop or disprove most of the probable ore reserves estimated by the R.F.C. examiners.

2. "Applicant states.....cost of production per ton is $6.50 delivered to car. Isn't this estimate too low and an indication that all cost data should be checked?"

It is believed that the applicant's estimate of $6.50 per ton "delivered to car" is undoubtedly too low for production in the Davenport Mine with a mill feed assaying 40 - 45% CaF_2.

As the company's records of its previous operation are not available, an accurate estimate of future costs would be difficult to make.

Direct Mining Costs

It was learned from Mr. F. T. Smrath, Mining Consultant, of Marion, Ky., that past experience indicates direct mining costs in western Kentucky vary within wide limits, but the average might now be about $6.50 per ton of crude ore. This rough average is not intended by Mr. Smrath as necessarily applicable to the Davenport Mine.

Development Costs

By using the R.F.C. estimate of probable ore and necessary development footage for veins number 2 and 3 from the 300 foot level to the 375 foot level, the development cost is estimated to be $4.00 per ton of concentrate. This cost is based on a block 75 feet high between levels. For the 50 foot block developed by the 350 foot level the estimated development cost would increase to about $5.20 per ton of concentrate.

Pumping Costs

The mines adjoining the Davenport Mine are not being operated so the company will have to unwater a large area.

The superintendent states that inflow of water is light

in the summer and fall but becomes heavy in late winter and early spring. Apparently the proposed new 50 H.P. centrifugal pump besides being a spare, is intended to increase capacity so that the large seasonal volume can be pumped.

The company now has 220 H.P. of pumping capacity, but it is established that no one on the supervisory staff knows how to interpret and apply the data from a pump performance chart nor how to calculate the size of a pump column.

The current cost of one cent per K.W.H. can be applied to power for pumping, but there is no basis for a cost per unit estimate. Mr. Hodge, President, estimates one month as the time required to unwater the mine after the heavy spring rains.

Concentrating Costs

Based on experience in the district, it is considered unlikely that milling and trucking costs will be less than $5.00 per ton of concentrate delivered into R.R. cars at Marion. The applicant claims costs of $1.12 a ton of mill feed when the waste dumps were being treated. The ratio of concentration is unknown.

General Overhead

The increment of cost per unit for general overhead is based on factors which are unknown at present. If a daily production of 25 tons of concentrates is assumed, general overhead might be $2.00 to $3.00 a ton.

Other Costs

Brokerage charges or sales commissions for sales of fluorite concentrates are usually 5% in this district.

Royalty payments of $3.00 a ton of concentrates are to continue to a total of almost $10,000 which will complete the purchase of the property.

3. "What are the backgrounds of the applicants in terms of operating experience, reputation, etc.?"

Mining Experience

Mr. Mervin E. Hodge, President, stated that he was interested in a tungsten mine near Dalconia, Nevada, operated during World War II. He is reported to have been connected with a silver mine in Mexico. This silver mine is said to have been operated profitably for 10 years. It was finally closed on account of the stringent Mexican labor laws. Mr. M. E. Hodge's mining

background is apparently more related to finances than to active mine management.

Mr. A. F. Driscoll, superintendent, is a local man who appears to be honest and a good practical operator. He has had little experience out of this district and no technical training.

Reputation

In addition, Kentucky since the former president relinquished his office, the applicants have been paying off the several local debts of the company. They report that they have reduced current liabilities to about $6,000 including tax arrears which were paid by Mr. Ben Clement. This amount is now owed to Mr. Clement. Payment was made on the lease in January, as required, and the balance owed on the purchase of the property is now less than $10,000.

The examiner did not have the opportunity to inquire about their reputation in St. Louis, Missouri where the applicants live, but the histories of the individual applicants in the R.F.C. files disclose nothing of a derogatory nature.

Legal Situation
(From statements by Messrs. Hodge and Carpelli)

Mr. Fred Funder, promoter and former Manager has been removed. The officers now are as stated in the application.

After he was removed, Mr. Funder instituted action to have a receiver appointed. This motion was denied by Judge Roy M. Shelbourne, Federal Court, Paducah, Kentucky.

At the request of the stockholders, Mr. Funder is scheduled to appear in court in April 1951 for an accounting.

After his petition for receivership failed, Mr. Funder as president, issued a mortgage on all the corporate property to himself as an individual. This mortgage was executed as security for about $205,000.00 which he claims to have loaned personally to the corporation. The stockholders maintain that this money was obtained from them.

Pertinent to the legal situation as related by Messrs. Hodge and Carpelli is the following excerpt from the R.F.C. file.

"Based on information obtained by Mr. Ellis (R.F.C. examiner) of funds which have been expended on this project since 1945, there appears to be a definite lack of management ability. According to Mr. Ellis, W. H. and N. T. Hodge have contributed $[illegible], Anthony Carpelli $41,000.00, Mrs. Schnur $100,000.00 and company has shown an account due Fred M. Funder for $190,000.00."

Exhibit A
From R.F.[illegible] File

Swain & Frazer Laboratory
Marion, Kentucky [illegible] 31 19[illegible]6

Certificates of Analysis

Davenport Mines, Inc.
Marion, Kentucky

Samples from Davenport Mines
submitted for analysis by
Mr. Chas. P. Reed, Marion, Ky.

Sample	Depth	SiO_2	Al_2O_3	$CaCO_3$	Fe_2O_3
Floor 300' level [illegible] vein					
A-19	4'	11.12	25.[illegible]	[illegible].9[illegible]	1.10
A-20	4'	12.26	[illegible]	17.[illegible]	5.04
A-21	4'	[illegible]	16.02	73.[illegible]	2.90
A-22	2'	[illegible].06	28.[illegible]	[illegible]	[illegible].04
A-23	2'	21.44	22.32	[illegible]	[illegible]
A-24	4'	16.56	22.0[illegible]	56.[illegible]	[illegible].94
A-25	4'	30.06	23.13	[illegible].72	2.04
A-26	6'	2[illegible].04	[illegible].3[illegible]	1[illegible].16	11.16
A-27	2'	7.18	12.66	77.[illegible]2	2.3[illegible]
A-2[illegible]	5'	3[illegible].62	8.74	[illegible]	3.08
A-29	[illegible]	75.08	2.02	2[illegible]	1.92
A-30	10'	[illegible]7.76	7.12	1[illegible]	[illegible]
A-31	[illegible]	3[illegible].04	18.20	3[illegible]	3.[illegible]2
A-32	[illegible]	18.[illegible]	[illegible]	2[illegible]	7.74
A-33	4'	27.3[illegible]	7.18	[illegible]	1.62
A-34	4'	35.02	7.0[illegible]	[illegible]	1.5[illegible]
Floor 200' level [illegible] vein					
B-43	[illegible]	[illegible]5.10	[illegible]	3[illegible].90	0.96
B-44	4'	27.4[illegible]	1[illegible].82	50.04	3.66
B-45	[illegible]	[illegible].50	1[illegible]	33.7[illegible]	3.32
B-46	[illegible]	57.[illegible]6	8.02	33.1[illegible]	0.9[illegible]
B-47	[illegible]	[illegible].92	12.5[illegible]	[illegible]	10.12
B-49	5'	53.74	22.9[illegible]	21.1[illegible]	2.16
B-50	[illegible]	56.44	12.92	[illegible].16	2.4[illegible]
B-56½	12'	10.22	12.36	[illegible]	2.7[illegible]
Neck of raise					
B-57	7'	9.02	12.2[illegible]	3[illegible].0[illegible]	10.6[illegible]
Floor 200' level					
B-58	7'	33.6[illegible]	18.[illegible]	42.72	[illegible].06
B-59	5'	27.4[illegible]	17.[illegible]	[illegible].1[illegible]	3.50

Swain & Frazer
Chemist

Exhibit [illegible]

Details of proposed use of $50,000 [illegible]

Development

Drift (350 foot level) 700 feet at $30.00 per foot - see Exhibit B-1	$21,000.00
Power - 4 months at $1000.00 per mo.	4,000.00
Pumps, materials and tools	1,700.00
	$26,700.00

Mine equipment

1 Ingersoll Sullivan single compound compressor with 150 H.P. motor 600 c.f.m. displacement or equal if this not available - Installed	$15,300.00
1 [illegible] loader - Model 12-B	3,000.00
2 [illegible] drills at $350.00	700.00
Miscellaneous - including [illegible] transformer capacity	2,500.00
	$21,500.00

Mining equipment

1 Fairbanks-Morse 3" centrifugal pump	1,900.00
1 - 60 H.P. motor for above	1,000.00
Overhead bronze pump rods	650.00
	3,550.00
Total	1/ $[illegible],750.00

1/ Mr. H. [illegible] Hodge, president, said that the stockholders would supply $4,750.00, if it is needed.

Exhibit 1-1

Drifting and [illegible] to develop the [illegible]

Estimate by [illegible], [illegible]

Number 1 vein - [illegible] drift trend yet completed

Required to drift under probable ore	350'
Drift out to Under 2 Vein - [illegible] to [illegible]	
Required	120'
Under 2 Vein	
Required to drift under probable ore	175'
Contingencies	55'
Total Drifts	700'

This development work on the 350 foot level is a substitute for the work on the 375 foot level recommended by [illegible], Jr. and the [illegible] engineers.

Exhibit [illegible]

[illegible] needed to Develop Ample Ore

[illegible] 300' level [illegible] 225' level

[illegible]	[illegible]tion - [illegible]			Short tons of concentrate [illegible]
	[illegible]	Lot 1	[illegible]	
Vein No. 1		1[illegible]	[illegible]	1,300
Vein No. 2		[illegible]00	300	10,000
Vein No. 4	75	300	300	8,000
Totals 1/	75	2000	1,100	19,300
Subtract Vein No. 1 Not [illegible]		1[illegible]00	[illegible]00	1,300
Vein Nos. 2 & 4 Totals	75	1100	[illegible]00	18,000
Estimated Cost/ft.	[illegible]000.00	[illegible]30.00	2[illegible].00	

Est. Cost 75' [illegible] - 15,000
Est. Cost 1100' [illegible] - 42,000
Est. Cost [illegible] - 15,000

Total Cost 72,000 Total Tons 18,000

Estimated development cost per ton of concentrate - 4.00

1/ Above data from [illegible] files.

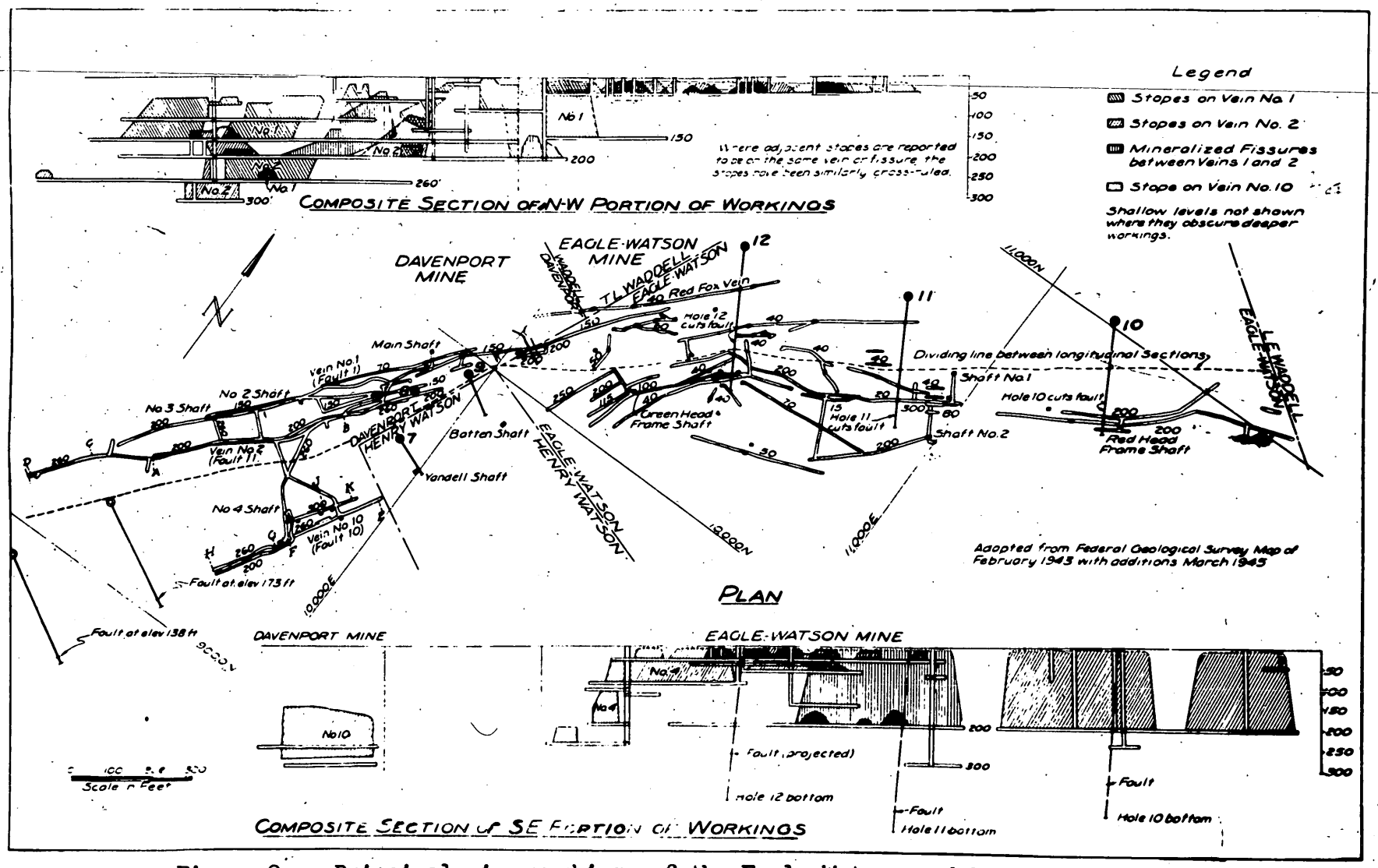


Figure 9. - Principal mine workings of the Eagle-Watson and Davenport mines.

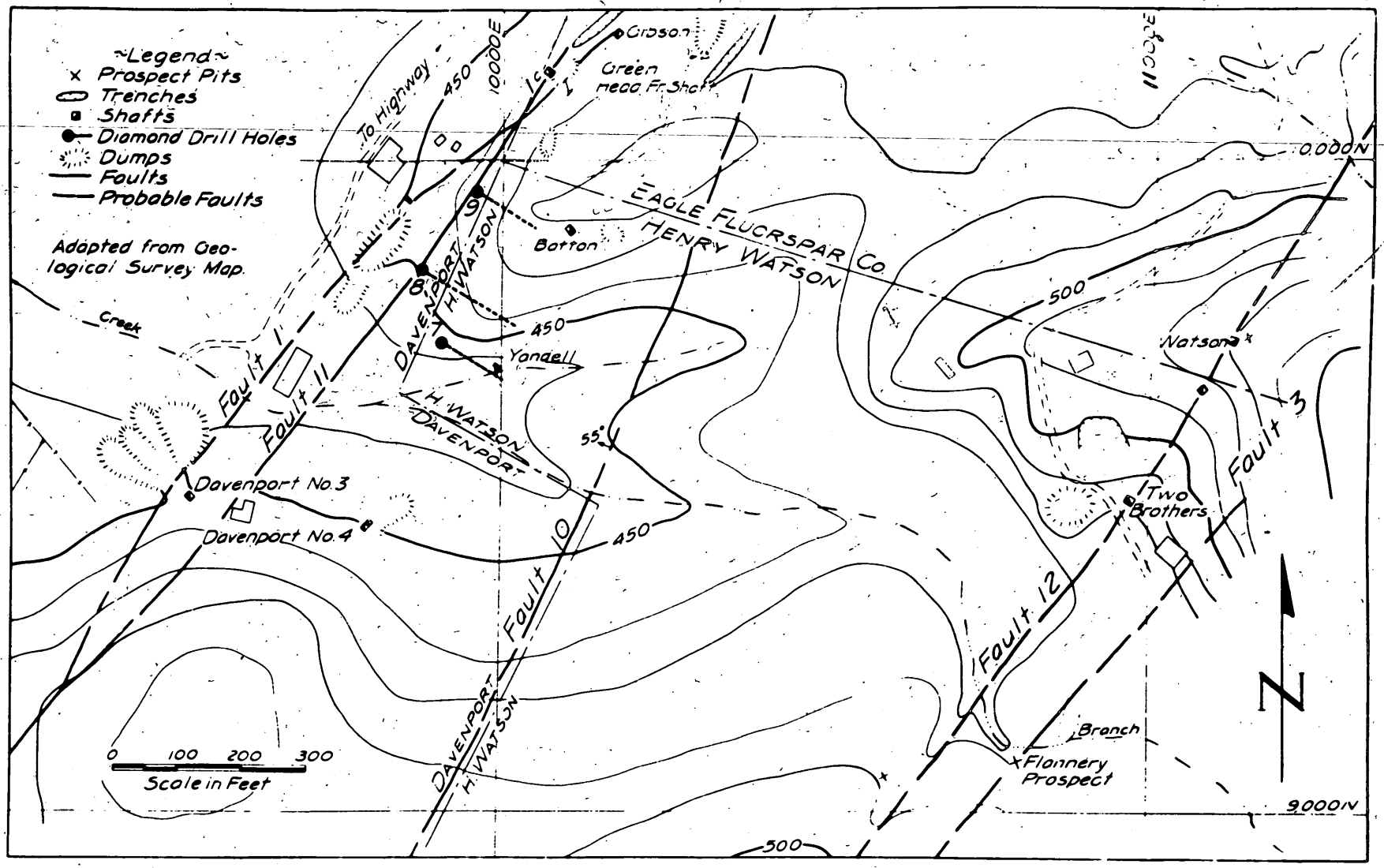
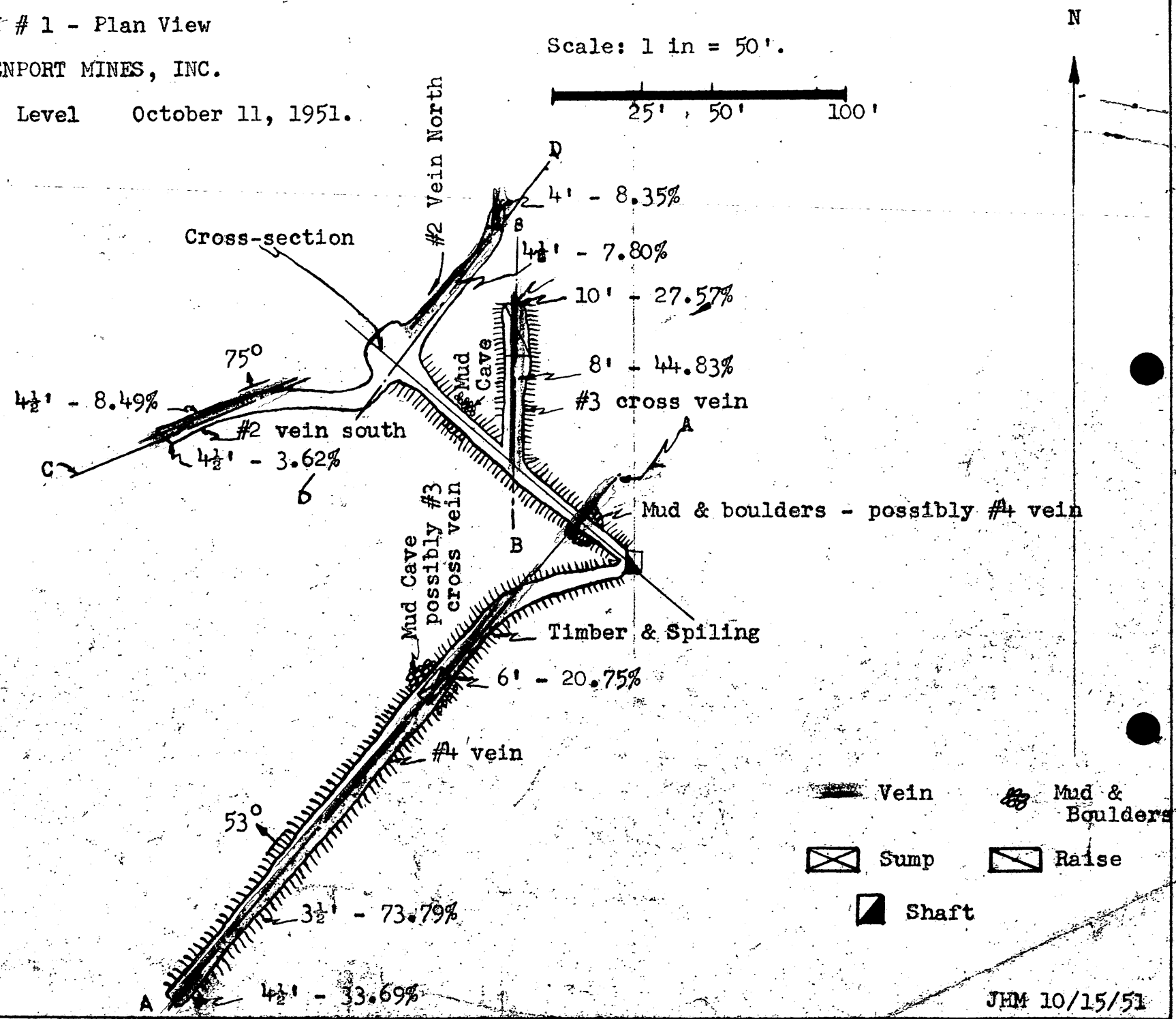


Figure 10. - Drill-hole locations, Henry Watson property.

PLAN # 1 - Plan View

DAVENPORT MINES, INC.

350' Level October 11, 1951.



JHM 10/15/51

Plan #2 - Cross Sections

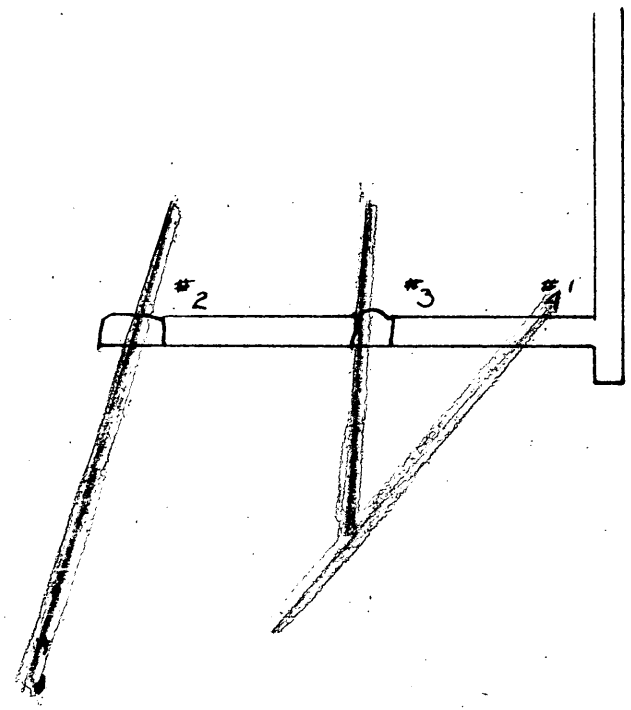
DAVENPORT MINES, INC.

25' 50' 100'

Scale - 1 in. = 50'.

Section taken along crosscut Northwest

Looking Northwest: 350' Level: October 11, 1951.



JHM - 10/15/51

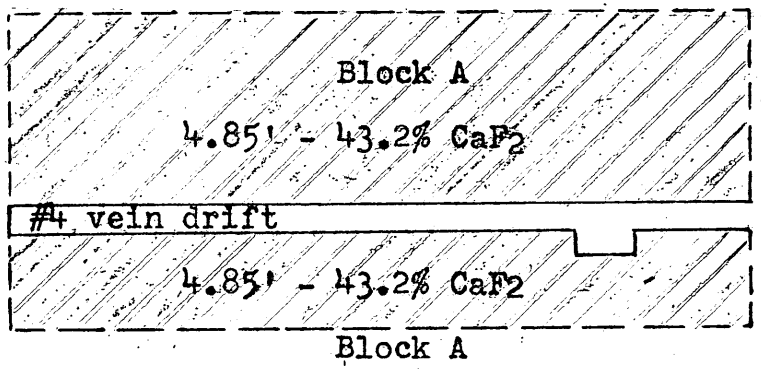
Sketch # 3 - Longitudinal Sections

DAVENPORT MINES, INC.

25' 50' 100'

Scale: 1 in. = 50'.

Section A-A - Looking Northwest.



Vol. - 47,045 cu. ft.
Tonnage - 4250 tons

Crosscut Northwest

Vol. - 23,086 cu. ft.
Tonnage - 2080 tons

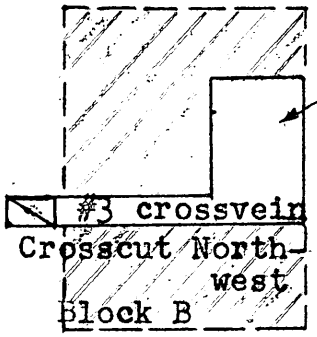
Combined Tonnage 6330 tons

Section B-B - Looking West

Block B

8.48' - 40.7% CaF_2

Vol. - 20,776 cu. ft.
Tonnage - 1848 tons



Possible juncture of #2 vein & #3 cross vein in #2 vein Drift North

8.48' - 40.7% CaF_2

Vol. - 13,568 cu. ft.
Tonnage - 1210 tons - Combined tonnage 3058

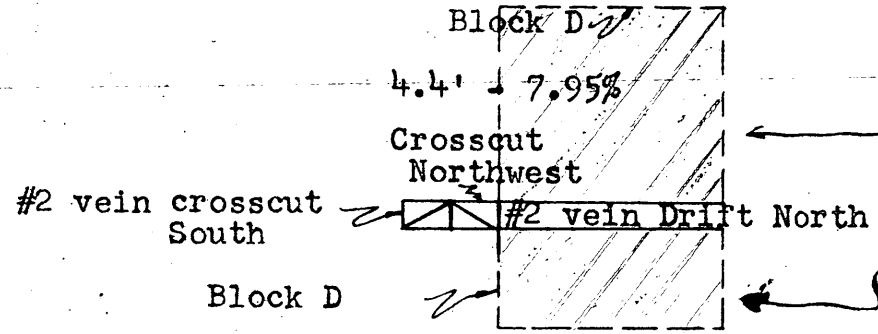
Sketch #4 - Longitudinal Sections

DAVENPORT MINES, INC.

25' 50' 100'

Scale: 1 in. = 50'.

Section D-D - Looking Northwest



Vol. - 34,980 cu. ft.

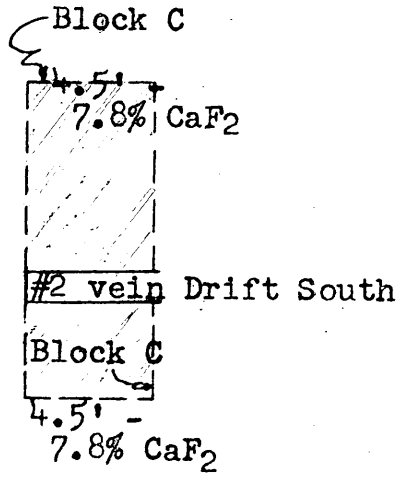
Tonnage - 2,990 tons

Vol. - 17,490 cu. ft.

Tonnage - 1,495 tons

Total tonnage - 4,485

Section C-C - Looking Northwest



Vol. - 7,650 cu. ft

Tonnage - 662 tons

Vol. - 3,825 cu. ft.

Tonnage - 331 tons

Total tonnage 993 tons

4(c) ENC. VI

THE SINK AND FLOAT DIVISION
C. TENNANT, SONS & CO., OF NEW YORK
100 PARK AVENUE
NEW YORK 17, N. Y.

TELEPHONE
OREGON 9-1300

CABLE ADDRESS
"SINKFLOAT" NEW YORK

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REPORT

on

DAVENPORT MINE, INC.

of

SALEM, KENTUCKY

By

Philip L. Jones

THE SINK AND FLOAT DIVISION
C. TENNANT, SONS & CO. OF NEW YORK
405 Miners Bank Building
Joplin, Missouri

November 11, 1952

SINK FLOAT
H H SINK FLOAT PROCESS.

REPORT ON DAVENPORT MINE

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14.	Electrical Installation
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Summary

1. Inventory

Mr. J. H. Minshall examined the physical assets to be seen on the surface on October 18 - 20, 1952 with the following results.

$176,795.67 worth of equipment was present as appraised by Mr. A. F. Driskill on May 25, 1950. The underground mine was flooded but it was believed that equipment underground listed by Mr. Driskill at $9,190.00 was still there. There was some additional equipment underground not listed by Mr. Driskill believed to be valued at $625.00. There was considerable missing equipment valued at $25,918.33, including the flotation mill, loader, truck, concrete mixer, welding machine and most movable equipment on the surface. The condition of the equipment that remained was fair, except for haulage ropes and belt conveyors.

2. Surface Prospecting

It was considered that further surface prospecting would be valueless.

3. Geophysical Prospecting

It was considered that as structures which are of interest to this mine now lie at the 350' level and below, about which geophysical prospecting could not be expected to give much information, cost of geophysical prospecting therefore would be wasted money.

4. Drilling

In view of the broken and heavily mined nature of the ground and the fact that the area of interest is immediately under such ground it was considered that drilling would be too expensive and unsatisfactory at best. Money spent on drilling could be better spent on underground development from existing workings.

5. Underground Development

Recent work extended the mine to the 350' level where ore bodies comparable to those found above were found to continue in depth. Dewatering mine and continuation of the exploration at the 350' level would be the best way of further developing the mine and would have the additional advantage of achieving output.

6. Ore Reserves

It was estimated that these are as follows:

Proven Ore	9,000	tons
Probable Ore	70,000	tons
Possible Ore	88,000	tons
Grand Total	167,000	tons.

This tonnage is assumed to be at a grade of 42% CaF_2 which is the grade of the proven ore. It will contain sulphide lead varying from .5% to 1% and sulphide zinc from 1% to 2%. These reserves do not includeore below the 500' level or above the 300' level except in the case of #1 vein which includes ore above the 350' level to the 260' level in the possible ore reserves.

7. Extraction Plant

It is recommended that the extraction plant be entirely revamped to obtain at least 80 tons in an 8 hour shift from the mine and 120 tons in an 8 hour shift from the mill. It should be modified to treat underground ore or dump ore containing any amount of clay or boulders and containing substantial amount of sulphide lead and sulphide zinc. Only in this way can the Davenport Mine be mined and milled to give substantial profits including local ore custom milled.

8. Dewatering

It is recommended that a 10" Pomona pump be put in #4 shaft to double the pumping capacity from the 350' level.

9. Mining

It is recommended that the #4 hoist speed be increased to 800 foot per minute. Also that an additional air compressor with 350 CFM capacity be installed. Attention must be given in the future mining to more efficient drilling and shovelling and traming and more working places maintained. This will entail at least one more drifter and one more stoper and installation of some type of air loader. To improve ventillation and to increase tonnage output it is recommended that #3 shaft now down to 260' level be sunk to the 350' level and its headgear and hoist rehabilitated.

10. Mill

It is recommended that the mill be completely revamped in line with paragraph 7 above. For this purpose larger primary and secondary breakers should be installed. The log washers should be

replaced by a Bradford breaker. A magnet must precede the secondary crusher. The washings from the washer after removal by screening of material which can be efficiently sink-floated or jigged must be sent to a thickener to act as a sump for an enlarged flotation plant. Flotation plant must be arranged to float lead and zinc concentrate as well as fluorspar. The flotation feed must be ground before floating. The sink must be crushed to $\frac{1}{4}$" and jigged to free it from zinc and lead when these are present. The lead can be made as a final concentrate in the jigs and in the flotation but all the zinc material must be returned to the flotation so that final zinc concentrate is of flotation concentrate to insure that the fluorspar is adequately separated from the zinc.

11. Electrical Installation

Provision must be made for approximately 500 horsepower more connected load.

12. Recovery

Such a flowsheet should recover about 80% of the CaF_2 in the ore making 45% by weight of the tonnage treated as 60% effective concentrate. About 75% of the sulphide lead should be recovered and about 65% of the sulphide zinc. At present prices this would make a ton of crude ore worth $20.00 in recoverable concentrates.

13. Estimated Cost of Improvements

Together with engineering and contingency it is suggested that at least $30,000.00 needs to be spent on the mining equipment. On the same basis at least $88,000.00 needs to be spent on the milling equipment, including repairs and new electrical installation. At least $30,000.00 needs to be available for dewatering, sinking, standby and spare stock. The total required is therefore about $148,000.00.

14. Conclusion

The prospects of the mine appear to be as good as or better than any comparable fluorspar operation of this size. The mill in the past has shown that it can efficiently handle the ore and dump material but was restricted by crushing and washing difficulties. It was inadequate to handle ore with higher contents of lead and zinc than have been usually handled in the field but which form substantial reserves of the Davenport Mine and its neighborhood. It seems that the mine justifies the addition of equipment such as is suggested above to increase output and recovery and the installation will then be superior to others in the district that can be compared with it. With present prices the additional capital necessary for the additions should be returned in reasonable time and the mine continue to operate at a satisfactory profit.

REPORT ON DAVENPORT MINE, INC.

General

This report is divided into three parts:

A - Inventory of Physical Assets on the Property as of October 20, 1952;
B - Discussion of Ore Reserves;
C - Recommendations for Extraction Plant.

A - Inventory

Mr. J. H. Minshall examined the property on October 18 - 20, 1952, during which time he took an inventory of the equipment to be seen at that time. Owing to the instructions given him not to make the inventory taking too obvious, details on the equipment are only as much as could be obtained under those circumstances. The inventory is as follows:

Schedule I - Inventory of Davenport Surface Equipment

1. #4 Shaft apparently in good condition - water stands about 40 feet below collar;
2. Headframe on #4 shaft in poor condition;
   (a) sheave wheel badly worn and needs replacing;
   (b) Walkway and stairway boards beginning to rot and needs replacing;
3. 7" Column Pomona is in #4 shaft. According to the watchman, rods have been replaced and the pump is ready to run. Motor and switches intact;
4. Fouhdation poured for hopper at #4 shaft;
5. Change house in fair condition; 100 gal. water heater o'k;
6. 4 - 1,000 lb. cans on top;
7. 2 - 1 ton dump cars in good condition;
8. 100 gal. fuel tank o'k;
9. Blacksmith shop;
   (a) 1½" pump (Sunbeam);
   (b) 1 vise;
   (c) 1 lubrication cart;
   (d) 1 bench grinder, complete;
   (e) 2 forges - o'k;
   (f) 1 Gardner Denver bit machine - o'k;
   (g) 1 drill press;
   (h) 1 pipe vise;
   (i) 1 air receiver (capacity 100 CFM);
10. Hoist room - Good Condition;
   (a) 1 air receiver;
   (b) 1 hoist complete, manufactured by United Iron Works (wire rope probably will need replacing);

(c) 1 Fairbanks - Morse electric motor (induction) type QVZK, frame SF444, serial #594464, 40 hp, 3 phase, 60 cycle, full load rpm 1750, 220-440V;

11. 1 Fairbanks - Morse electric motor for underground pump. Has been submerged andneeds drying out. Type QZK, frame RS365S, Serial No. 595466, 40 hp, 3 phase 60 cycle, full load rpm 3520, 220-440V;
12. Switch boxes for hoist on wall;
13. 1 Sentinel patent compressor, complete - Good condition;
    (a) capacity 250 CFM;
    (b) V belt drive, good condition;
    (c) Crompton Parkinson electric motor #15121502 Brake hp 67.5, rpm 1460, 400-440V;
14. (a) 13 joints of 20' section 3" pipe - poor condition;
    (b) 1 joint 12" section 4" pipe - poor condition;
15. Wooden ramp and grizzly - poor condition;
16. Primary crusher (Carterville) 9" x 14" complete - fair condition;
    (a) Fairbanks - Morse electric motor, type QZK, frame RS326, serial No. 5922, 15 hp, e phase, 60 cycle, full load rpm 1745, 220-440V;
17. 75' conveyor and gallery - 18" wide;
    (a) rubber belting ruined;
    (b) G.E. electric motor - excellent condition, type K, code J, Frame 225, 3 hp, 3 phase, 60 cycle, 220-440V rpm 1725;
    (c) V Belt drive - Good condition;
    (d) American speed reducer #4 serial No. T43735
18. Log washer - condition poor, shoes worn, drive and electric motor o'k;
19. 36" Picking belt, condition fair, drive and electric motor o'k;
20. Grizzly - Condition poor;
21. Secondary crusher (Webb Corp.) 9" x 14" - fair conditon
    (a) V belt drive - belts worn;
    (b) G.E. Motor (induction) type K, code F, frame 326, 15 hp, 3 phase, 220-440V, 60 cycle, rpm 1745, model 5K326D191;
22. 18" conveyor and gallery approximately 70' long;
    (a) belt ruined;
    (b) G.E. motor, V belt drive and reducer o'k;
23. H.H. Sink and Float Plant;
    (a) Denver Dillon preparatory screen
        (1) upper cloth repaired should be replaced
        (2) V drive and motor o'k;
    (b) Splitter tank o'k;
    (c) Medium elevator o'k
    (d) Reagent feeders badly corroded;
        (1) motor o'k;

(e) Separator o8K
    (1) motor and drive o'k;
(f) Allis-Chalmers low head preparatory screen o8k
    (1) motor, drive and vibrator o'k;
(g) Syntron vibrator on feed chute possibly have to be replaced;
(h) Heavy medium elevator has been repaired;
(i) Stock tank o8k with about 6 - 7 ton dry weight of medium galena;
(j) Denver Flotation cell (2 cell)
    (1) #1 cell fair
    (2) #2 cell o'k
    (3) motors and belts o'k;
(k) Switchboard o'k - has been reqired;
(l) Thickener - o'k
(m) Medium flotation & tailings pump o'k;
    (1) motors o'k
(n) Sump pump
    (1) motor burned up;
(o) Compressor o'k;

24. Hardinge 3 foot conical ball mill o'k;
    (a) Motor o'k;
25. Classifier - spiral well worn;
26. Screen cloth spares;
    (a) 1 stainless steel cloth for AC low head
    (b) 1 slotted punch plate for Denver Dillon;
27. 1 Braun jaw crusher o'k;
28. 1 Braun pulverizer o'k;
29. Wilfley pump o'k
    (a) V drive o'k
    (b) motor, 3 hp, No. S69727 o'k;
30. 6 cell wooden jig - condition fair;
    (a) Fairbanks-Morse electric motor, 10 hp, No. 583647, rpm 875 o'k
    (b) V belts condition fair;
31. Tails conveyor belt 18" and gallery, approximately 100' Condition poor;
    (a) G.E. motor 2 hp - No. 5K224d38, 220-440V, rpm 1735 o8k
    (b) American spped reducer No. 4
    (c) V belt drive o'k
32. 18" Product belt, length 40' approximately, with gallery-Condition poor;
    (a) Fairbanks-Morse elec. motor 1 hp, No. F23627, rpm 1735
    (b) V belt drive o'k
    (c) American speed reducer No. 2 o'k;
33. Storage Yard 100x45 concrete floor;
34. 6 transformers;
35. 1 steam hoist;
36. 1 Worthington 4" pump complete o'k
    (a) Master AC Motor, No. QC1021, style 61591, 220-440V 5 hp, 60 cycle;
    (b) Switch box, o'k;

37. No. 3 shaft - needs some repairs, but could be used - approximately 260' deep;
38. 2 hoists at No. 3 shaft - condition fair;
39. Gardner-Denver 4" steam pump;
40. 2 powder houses;
41. 1 Pomona 7" pump complete - o'k;
42. Various hand tools on property - no estimate made of amount as it is believed that some tools belong to mechanics;
43. 3 room frame office building, assay and scale room;
44. Fair Scale Co. outside wagon scale - capacity 23,000 lbs;
45. 2 flat top wooden desks;
46. 1 frame hoisting house;
47. 1 frame Blacksmith and repair shop;
48. 2 mill ponds;
49. Roadways from highway to mill
    (a) some repairs needed on culverts.

An appraisal was made of this equipment by Mr. A. F. Driskill on May 25, 1950. The appraisal value of the above equipment was given as $176,795.67. Comparing the above list with Driskill's, the following equipment may be in the mine under water:

SCHEDULE II - List of Equipment That May Possibly be Underground

1. 1 Fairbanks-Morse Underground Pump No. 593831-3" with motor;
2. 1 Fairbanks-Morse Electric pump No. 595466-2" without motor;
3. 4 - 1,000 lb. cans @ $25.00 each;
4. 5,000 ft. 12 lb. steel rail;
5. Tramway conveyor installed.

This equipment is appraised in Mr. Driskill's list at $9,190.00.

The following does not appear on Mr. Driskill's report, but according to watchman was left in the ground.

Schedule III - Additional Equipment That May be Underground According to Watchman

1. 2 jackhammers mounted on posts and arms
2. 1 stoper
3. 3 mine cars
4. 2 1,000 lb. cans

This equipment is estimated at about $625.00.

The following equipment contained in Mr. Driskill's list should have been on the surface and was not seen:

Schedule IV - Missing Equipment
1. 1 flat top wooden desk
2. 1 L.C. Smith typewriter No. 10844648B

3. Assay equipment, scales, containers, etc. "Fischer"
4. 1 Smith Welding Co. Acetylene torch
5. Sunbeam Electric Co. steam turbine No. 37087H
6. Sunbeam Electric Co. steam turbine No. 37091H
7. Lot of miscellaneous small saws, tools, drills, wrenches, etc.
8. Tool shop supplies, pipe, valves, tools, etc.
9. Three 3" steam pumps installed @ $150.00 ea.
10. 30 pulley wheels 10" to 24" steel
11. 1 International Tractor Loader M169573
12. 1 1949 Ford Truck Motor No. 192482
13. 1 sand float mill
14. 2 surface Comb. Corp. gas heaters and tank; No. 11471504 and No. 11471505
15. 1 Trackson Co. tractor Model 14 No. 7J7777WSP
16. Lot miscellaneous shovels, picks and hammers
17. Randall Zogg concrete mixer.

The value of this equipment was appraised by Mr. Driskill at $25,918.33.

B. - Ore Reserves

Surface Prospecting

Mr. Minshall examined the surface of this property and came to the conclusion that surface prospecting would be valueless, with which we agree.

Geophysical Prospecting

At the present time the property is mined down to the 300' level and some ore, according to local gossip, 600 tons, has been taken out of the 350' level. The future reserves of the property therefore lie on the 350' level and below, although, according to some of the miners, there is considerable ore in parts of the mine above the level and particularly there are ore bodies containing high zinc with lead which have been left behind.

Maps exist showing the mine from the 150' level to the 300' level, prepared by Mr. A. H. Reed, dated July 7, 1942. At this time apparently the 300' level had been only partly mined out. Subsequently the 300' level was nearly mined out.

On October 11, 1951 Mr. J. H. Minshall examined the Davenport mine which had, at that time sunk the No. 4 shaft to the 350' level. He surveyed the work done and included the maps in his report. His report shows that the ore bodies extend to this level and below, and that 9,388 tons ore was proved at 42.3% CaF_2.

In view of the above facts any type of geophysical prospecting on the surface is unlikely to give any information that would be

useful in extending the ore reserves. At best, any type of geophysical prospecting cannot be expected to give much information on the behavior of small structures more than 200' below surface. Since the information would be required to extend ore reserves of the Davenport Mine would be to give information on the ore body at the 350' level and below, geophysical prospecting of the Mine would be wasted money.

Drilling

The quickest method of developing ore is usually drilling and it is often the cheapest, but adverse conditions for drilling hold at Davenport.

The ground is broken and full of caves and old workings, especially near fault structures. Nothing is more hazardous to drilling than old timbering. Under these circumstances it is estimated that churn drilling of the first 60' would cost about $15.00 per foot. Thereafter, the cost would be about $4.00 per foot. Between 500 and 600' the hole should be core barrelled which would cost about $10.00 per foot. Thus, a 600' hole would cost about $6,300.00 and at least three would be desirable, costing about $19,000.00. This seems high, but discussing this with local drillers who have had experience in the fluorspar field, we found none willing to contract drilling on this ground, and all would work only at cost plus basis. This bespeaks a high cost of drilling.

Examination of section BB on SF-336 shows that the area of interest for deep level development lies vertically underneath #2 vein. This is where the vein system appears to be closing together between the 500 and 600 feet level, and is the zone of interest. Vertical drilling is preferable to any in this disturbed ground, but is not possible except through old workings. Inclined drilling only is a practical possibility and will be difficult to direct.

Money spent on drilling could be better spent by underground development from the existing workings.

Underground Development

The information contained in Mr. Reed's map of July 7, 1942, together with the information contained in Mr. Minshall's map of October 11, 1951 are combined in the encompanying plan SF-336. Mr. Minshall's work shows that where the 350' level underlaid the 300' level that the ore chutes and veins were met in approximately the place where they would be expected, as in the case of #4 and #3 veins. It is to be remarked that a vein parallel to #2 vein appeared south-east of where #2 vein would be expected if it continued dipping vertically as it had between the 200' and 300' level. The displacement could be explained by a fult of #2 vein, or this may be a new vein. It contained good spar and zinc.

Cross section BB of the workings in SF-336 taken across the part of the mine in which the 350' level had cut both #4 and #2 vein

shows that vein system if extended might be expected to meet somewhere between the 500' and 600' levels. The veins as seen on the 350' level are still strong and give the same indication of ore beneath them as they had at each preceding level above. In fact, the #4 vein at 350' ran into better ore than was found in the 300' level above.

The 350' level had not been continued far enough to cross the #1 vein and perhaps had not cut #2 vein, but it had work on the small #3 cross vein which had appeared on the 300' level, and good ore was found there.

No. 1 vein has been neglected in the past apparently because little ore was found on a limited length of this level opened on 260' level, the north section of the mine, although considerable ore was found on the 200' level. It seems likely that this was a mistake and that this vein, which is the main vein, described by geologists as #71 of the Moore Hill fault system will behave as have all the other veins and contain ore in intermittent bodies in the same was as they do. Thus, for instance, as remarked above, little minable ore occurred in vein #4 on the 300' level above a good block of ore 190' long on the 350' level. No. 1 vein should be actively prospected and there is no reason why it will not develop as have #4 and #3.

The work done recently, therefore, has developed the mine to a lower depth than before with all indications that ore continues below the deepest workings.

General expectation in the district is when two fault veins meet, that considerable body of ore may be found at the intersection and the existing structure as shown by the cross section on SF-336 indicates that this may occur somewhere between 500' and 600'.

In view of the above considerations, dewatering the mine and driving of the present north-east to south-west cross cut on the 350' level for a further 150' to cut #2 and #1 veins together with drifting on the veins that are cut would be the cheapest and most satisfactory method of further development.

Ore Reserves

Based on Minshall's work and SF-336, the following ore reserves can be set up in rounded figures on the following basis:

(a) Proven ore; as in Minshall's report, i.e., strikes and widths as found in drifts on 350' level, height of ore block 50' above and depth 25' below drift, with CaF_2 grade as in report, i.e. 42% CaF_2: as follows:

#3 vein	3,000 tons
#4 vein	6,000 tons
Total	9,000 tons

(b) Probable ore extension of ore bodies beyond present 350' drifts to same strike as ore was found above with height of ore block 50' above and depth 50' below drift; same grade as in Minshall's report, as follows:

#1 vein 480' strike @ 40 tons/foot	19,000 tons
#2 vein 600' strike @ 40 tons/foot	24,000 tons
#3 vein proven ore extended down 25' more	1,000 tons
# 140' strike @ 40 tons/foot	6,000 tons
#4 proven ore extended down 25' more	2,000 tons
450' strike @ 40 tons/foot	18,000 tons
Total	70,000 tons

(c) Possible ore extensions of above to 500' level from 400' level as in (b) plus ore above 350' level to 260' level on #1 vein

#1 vein 480' strike @ 40 tons/foot to 500' level	19,000 tons
480' strike @ 20 tons/foot 300' - 260'	9,000 tons
#2 vein 600' strike @ 40 tons/foot	24,000 tons
#3 vein 240' strike @ 40 tons/foot	10,000 tons
#4 vein 650' strike @ 40 tons/foot	26,000 tons
Total	88,000 tons

Summarizing:

	Proved	Probable	Possible
#1 Vein	--	19,000	28,000
#2 Vein	--	24,000	24,000
#3 Vein	3,000	7,000	10,000
#4 Vein	6,000	20,000	26,000
Totals	9,000	70,000	88,000

Grand Total - 167,000 tons.

Grade of this ore is assumed as in the proven ore as 42% CaF_2. Sulphide lead will vary from .5% to 1.0% and sulphide zinc from 1% to 2%. There are bodies of ore left behind or dumped that run much higher in lead and zinc than this but it is difficult to estimate what the total Pb and Zn grade would be attained if, because Pb and Zn could be recovered, such bodies were mined and treated.

C - Recommendations for Extraction Plant

The following were the main considerations for this:

(a) The mine should be able to produce at least 80 tons daily in an 8 hour shift (10 tons hourly);
(b) The mill should be able to treat at least 120 tons daily in 8 hour shifts (15 tons hourly);
(d) The mill should be able to treat any kind of ore such as clayey mine ore or rocky dump ore;
(d) The mine and surrounding dumps contain substantial tonnages of lead (galena) and zinc (sphalerite) which have not been recovered in the past but which should now be recovered.

Dewatering

The mine has been constantly flooded in the past, almost yearly. It is important this never occur again. At present a 7" casing Pomona pumps about 550 g.p.m. from the 350' level, a 3" Fairbanks-Morse underground pump pumps about 300 g.p.m. from this level and a 2" fairbanks-Morse underground pump pumps about 150 g.p.m. In addition a 7" Pomona in a drill hole pumps from the 260' level to the surface mill pond. Its suction is in a sump and it usually works one hour daily, thus delivering about 3,600 gallons daily. If this pump did not work this water would find its way down the drifts and cross-cuts to the sump of #4 shaft and be picked up by the other pumps. This pump does little dewatering therefore and seems an expensive way of supplying a mill pond. On the other hand, it is too small to be removed and put in the #4 shaft.

It is the consensus of opinion that at least as much again needs to be pumped. This would necessitate a 10" Pomona in the shaft. The 7" Pomona in the drill hole could be drawn and sold and cheaper and simpler arrangement made to culvert the water from the sump on the 260' level and to supply the pond.

Mining

The mine as worked in the past has never shown itself capable of sustained production over about 35 tons per 8 hour shift. This was due to slow hoisting, lack of air, inefficient breaking, too few working places, slow shovelling, and slow traming.

The speed on #4 hoist is now less than 500' per minute. This should be increased to about 800' per minute. Some attention to the headgear and sheave would be necessary to use this speed to avoid bumping on the cribbing. It appears that the headgear is not level and the sheave is not in the center of the shaft. The can should be picked up by a center pull and a bin should be built in this headgear and arrangements made for a hooker to dump the cans.

Even with the production achieved in the past, air was insufficient and caused slowdowns in drilling. An additional compressor of about 350 CFM capacity would take care of this and provide capacity for additional drills and loader.

Insufficient breaking may have been due to several causes. Probably the two most important were: (1) drilling and spacing of holes and (2) type and amount of powder used. These two can be remedied by tests carried out in the ground.

It would be advisable to have more working places to maintain grade and tonnage and at least one more drifter and one more stoper should be added to the machines. There would be ample air capacity for these if the extra compressor above were obtained.

With a tonnage of ore developed it would pay to install an air loader such as a 12B Eimco or similar machine which would decrease shovelling labor and increase output.

To improve ventilation at the lowest level and to increase tonnage hoisted #3 shaft now down to 260' level should be sunk to 350' and the headgear rehabilitated.

Mill

The flowsheet suggested to handle any kind of fluorspar found in this district up to 15 tons per hour is shown in SF-333. The basis for this design is:

(a) Experience with previous mill;
(b) Examination of ores previously treated by the mill.

With respect to the previous mill, its working was satisfactory with fluorspar ore low in lead (below 0.5%) and zinc (below 1.0%) up to about 8 to 9 tons per hour. Certain ores, especially dumps without clay were treated as high as 15 tons per hour but dumps with many boulders, dumps with clay and underground ore with much clay (which are the common ores of the field) were restricted in treatment rate. Reasons for this restriction were:

(a) Feed gape of primary jaw crusher (7") was insufficient, necessitating closely spaced bars on bin top and either discard of boulders or much hand cobbing of boulders:
(b) Inability of log washers to take pieces above 2" to 3" in size at any reasonable tonnage rate. As the primary crusher was incapable of getting the clayey ore through without opening the setting to let through 3" or larger the log washer constantly broke down when attempts to treat tonnages much above 7 to 8 tons per hour of clayey material were tried;
(c) There was no magnet to protect the close setting secondary crusher from iron. This caused many stoppages and costly repairs;
(d) Inadequate size of secondary crusher. This was too small to treat over 10 tons per hour under best conditions;
(e) No satisfactory arrangements to collect the washer slimes and feed them to flotation except by hand;
(f) Flotation plant was far too small, only treating ½ to 1 ton

per hour, whereas the best overall results would result in treating a larger proportion of the crude ore than this;

(g) The flotation feed was inadequately deslimed and as fed straight from settled log washer overflows, too coarse for liberation of spar locked to calcite. Some grinding was required here;

(h) The jig plant on the fines from the Sink-Float was not large enough to treat them adequately when underground ore of fine and fines in this jig feed was unfavorable to good recovery;

(i) The sink produced by the Sink and Float plant when leady and zincy ore was treated contained all the sulphide lead and zinc in the Sink-Float feed which was not payed for and often contained too much lead and zinc to be acceptable for sustained shipment of metallurgical spar.

Examination of the ore during the last few years showed:

(a) Log washer overflows (sand and slimes) would run from 2% to 25% crude ore;

(b) Sink-Float feeds (+7 mesh) would vary from 85% to 45% crude ore;

(c) Fines jig feeds would vary from 13% to 30% of crude ore;

(d) That the fines needed to be at least 35 mesh to be floated satisfactorily;

(e) The jigs did not recover spar of 35 mesh or finer to any extent;

(f) The lead and zinc derived from the first cell of the fines jigs could be separated in another jigging operation;

(g) That sink crushed to ¼" round hole and often coarser could be satisfactorily jigged to separate over 90% of the galena and over 70% of the sphalerite.

All the above factors were considered and in the flowsheet SF-333 as follows;

(a) A large feed gape (18") primary crusher is specified;

(b) The log washer is replaced by a Bradford breaker developed locally for use in the clayey strip-pit ores of Joplin that has worked most satisfactorily and far superior here to log washers;

(c) A magnet is specified on the old sorting belt;

(d) A larger secondary crusher is specified which can be shut down to finer size than before, thus increasing recovery of spar in the Sink-Float plant;

(e) The washings from the washer are screened to remove all ore of size adequately to be treated in Sink-Float plus jigs (plus 20 mesh) and the undersize collected in a thickener which will overflow some of the colloidol iron oxides and act as storage for the subsequent float plant that can therefore run 8, 16 or 24 hours as needed;

(f) Flotation plant arranged to float a lead and zinc concentrate. All the zinc concentrate from the fines and sink jigs will be put into the flotation circuit so that all zinc will be produced as

float concentrate. Fluorspar is objectionable in zinc concentrates and jigs cannot satisfactorily separate sphalerite from fluorspar whereas flotation can. Subsequent to differential Pb - Zn flotation the tailing from this operation containing the spar is dewatered in a cyclone to remove reagents added for Pb - Zn flotation and also the finest slime present since this is not satisfactorily treated by fluorspar flotation. The thickened pulp is conditioned and floated to make spar float concentrate which should be a least 90% CaF_2;

(g) A ball mill and classifier precede the float plant to free locked particles;

(h) With the above flow sheet much of the present tonnage now going through the jigs and not being recovered there will be diverted to the flotation where it will be recovered. The proportion of crude ore put through the jigs will be reduced so that without alteration they will be sufficient in capacity. From the first cell a lead zinc fluorspar concentrate will be obtained;

(i) The sink will be crushed to ¼" in close circuit rolls or other suitable crusher and jigged to produce a final lead concentrate, and a zinc-spar concentrate that is sent to flotation. The lead-zinc-spar concentrate from the fines flotation is fed to these jigs for final cleaning of the lead. Recirculation of middlings in this circuit will maintain high enough metal loads to obtain good final lead jigging. The tailings from this operation ane dewatered in a drag, the drag sands making metallurgical spar and the overflow containing fine spar being pumped to the float spar concentrate dewatering vats;

(j) The lead and zinc float concentrate are dewatered by a filter but the difficulties that occur in dewatering spar float concentrates would best be avoided in such an operation as this by a filter but the difficulties that occur in dewatering spar float concentrates would best be avoided in such an operation as this by using settlement boxes for dewatering.

Electrical Installation

This must be checked for increased power load. This was fully loaded in the old mill. The suggested extra equipment as above will add 428 horsepower connected load. Provision for about 500 horsepower connected load should be made.

Recovery

By the above flowsheet for mine ore about 80% of the CaF_2 in the ore should be recovered into a concentrate that will make 45% by weight of the tonnage treated as 60% effective concentrate. About 75% of the sulphide lead should be recovered. About 65% of the sulphide zinc should be recovered. On this basis at present prices, rounded figures, $37.50 per ton for 60% effective spar, $200.00 per ton for lead concentrate, $90.00 per ton for zinc concentrate a ton of ore will recover about $20.00 worth saleable products. With lead and zinc prices that held last year this would be increased 10%.

Estimated Cost of Improvement

The following are the estimated costs of equipment installed and alterations mentioned as necessary above at good used prices:

Dewatering Pump	$ 11,000.00
#4 Hoist, including new wire	2,000.00
New Compressor & Pipe	7,000.00
Machines	1,000.00
Loader and Hose	3,000.00
#3 Hoist including new wire	2,000.00
Total	$ 26,000.00
Engineering	1,000.00
Total	$ 27,000.00
Contingency	3,000.00
Total Mining	$ 30,000.00
Milling equipment installed, including repairs on existing equip. & electrical	76,000.00
Engineering	4,000.00
Total	$ 80,000.00
Contingency	8,000.00
Total	$ 88,000.00
Grand Total	$118,000.00

To this must be added cost of dewatering and cleaning mine, sinking #3 shaft to 350', standby and overhead charges and cost of stock spares, at least $30,000.00 before mine would be ready to run.

BUREAU OF MINES
224 NEW CUSTOMHOUSE
DENVER 2, COLORADO

OFFICIAL BUSINESS

MR. JAY L. CHAMBERS, CHIEF
CONTRACT ADMINISTRATION & AUDIT DIV.
DEFENSE MINERALS EXPLORATION ADM.
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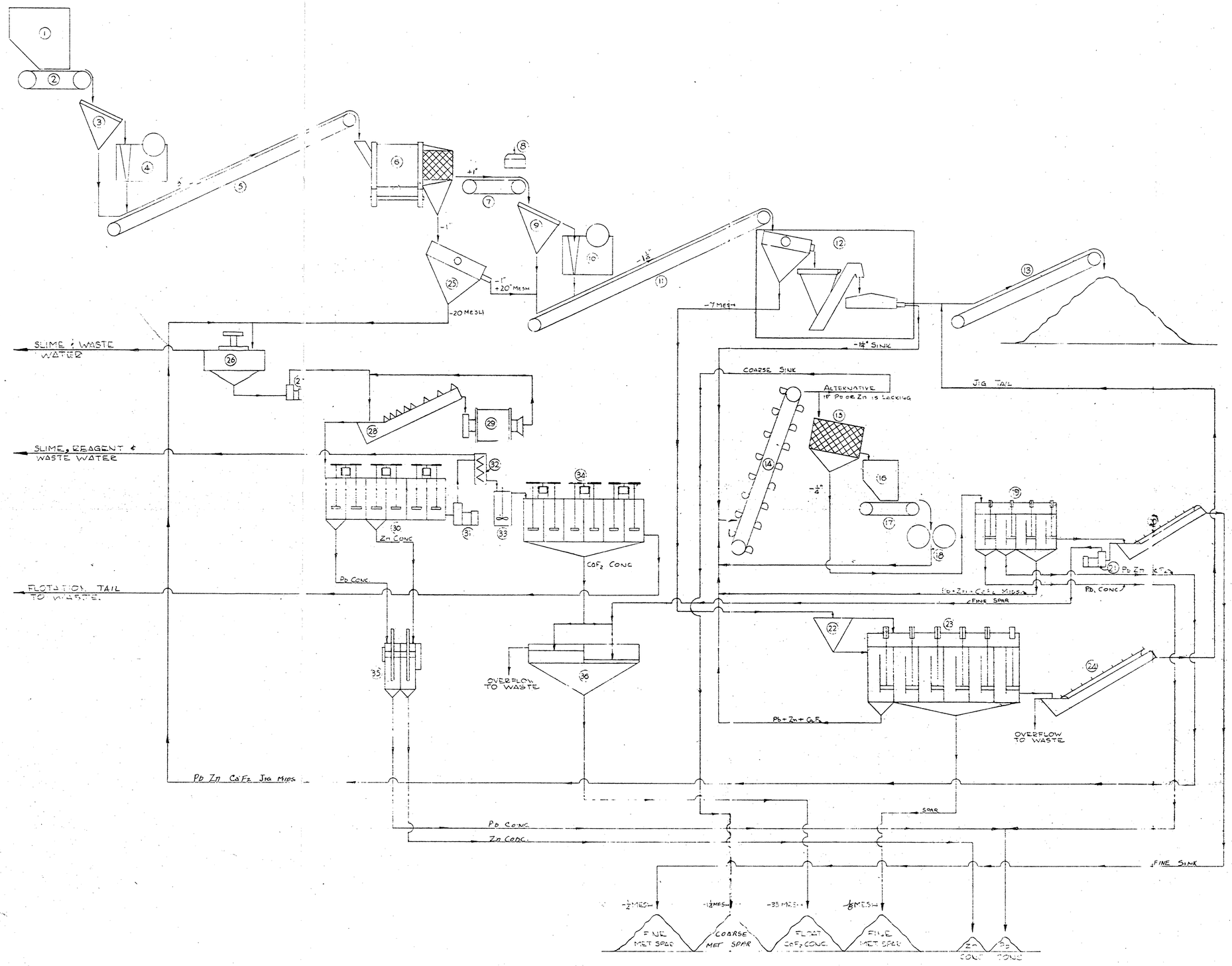
WASHINGTON 25, D. C.



EQUIPMENT SPECIFICATIONS

ITEM	OPERATION	SPECIFICATION	H.P.
1	CRUDE ORE STORAGE	1-150 TON WOODEN BIN	
2	CRUDE ORE FEEDER	1-24" APRON FEEDER	0
3	COARSE ORE GRIZZLY	RAILS SPACED 3" GAP	
4	PRIMARY BREAKER	1-18"x24" WIDE JAW CRUSHER	50.0
* 5	MAIN FEED CONVEYOR	1-18" BELT CONVEYOR	*3.0
6	WASHER	1-6'0"x6'-0" BRADFORD BREAKER	*
		& 2'-0"x2'-1" SCREEN	20.0
* 7	SORTING BELT	1-36" WIDE FLAT BELT CONV.	*1.0
8	MAGNET	30" DIA.	5.0
* 9	FINE ORE GRIZZLY	BARS SPACED 1½"	*
10	SECONDARY BREAKER	1-10"x20" JAW CRUSHER	30.0
* 11	SINK FLOAT FEED CONV.	1-18" BELT CONVEYOR	*3.0
* 12	SINK FLOAT PLANT	1-H.W. D&O SINK FLOAT UNIT	*9.0
* 13	FLOAT WASTE CONVEYOR	1-16" BELT CONVEYOR	*3.0
14	SINK ELEVATOR	1-18" WIDE SPACED BUCKET	
		ELEVATOR LINE SHAFT DRIVE	
15	CRUSHED SINK SCREEN	1-4'0"D.x6'-0" LONG, ¾ D. ROUND	
		HOLE TROMMEL LINE SHAFT	
		DRIVE	50.0
16	CRUSHED SINK BIN	1-50 TON WOODEN BIN	
17	CRUSHED SINK FEEDER	1-18" BELT FEEDER LINE	
		SHAFT DRIVE	
18	SINK CRUSHER	1-36"D.x16"W SLOW SPEED	
		ROLLS LINE SHAFT DRIVE	
19	SINK LEAD JIGS	4 CELLS @ 3'-0" WIDE, 3'-0" LONG	
20	SINK DEWATERING DRAG	1-18" BELT DRAG, DRIVEN OFF JIGS	5.0
21	FINE SINK PUMP	2" WILFLEY	3.0
22	FINES DEWATERING	3'-0"x3'-0" CONE	
	CONE		
* 23	FINES JIGS	6 CELLS	*
24	FINES TAILING	18" BELT DRAG DRIVEN	10.0
	DEWATERING DRAG	FROM JIGS	
25	WASHED UNDERSIZE	2'-0"x6'-0" D.D. DENVER DILLON	
	SCREEN	20 MESH	2.0
26	SLIMES THICKENER	1-30'-0" DIA. x 10'-0" HIGH	1.0
27	SLIMES THICKENER	1-3" WILFLEY PUMP	3.0
	PUMP		
28	SLIME CLASSIFIER	1-24" SPIRAL CLASSIFIER	3.0
29	SLIMES BALL MILL	1-5'-0"x5'-0" BALL MILL	30.0
30	Pb & Zn FLOTATION	6 CELLS 18 SP MACHINE & FEEDERS	23.0
31	SLIME DEWATERING	3" WILFLEY PUMP	3.0
	PUMP		
32	SLIMES CYCLONE	4" CYCLONE	
33	SPAR CONDITIONER	1-4'-0"x4'-0" CONDITIONER	1.5
34	SPAR FLOTATION	6 CELLS 18 SP DENVER	23.0
35	Pb & Zn FILTER	1-2 DISK 6'-0" DIA	11.0
36	SPAR CONCENTRATOR	2-10'-0"x10'-0" CONCRETE	
	SETTLING TANKS	TANKS	

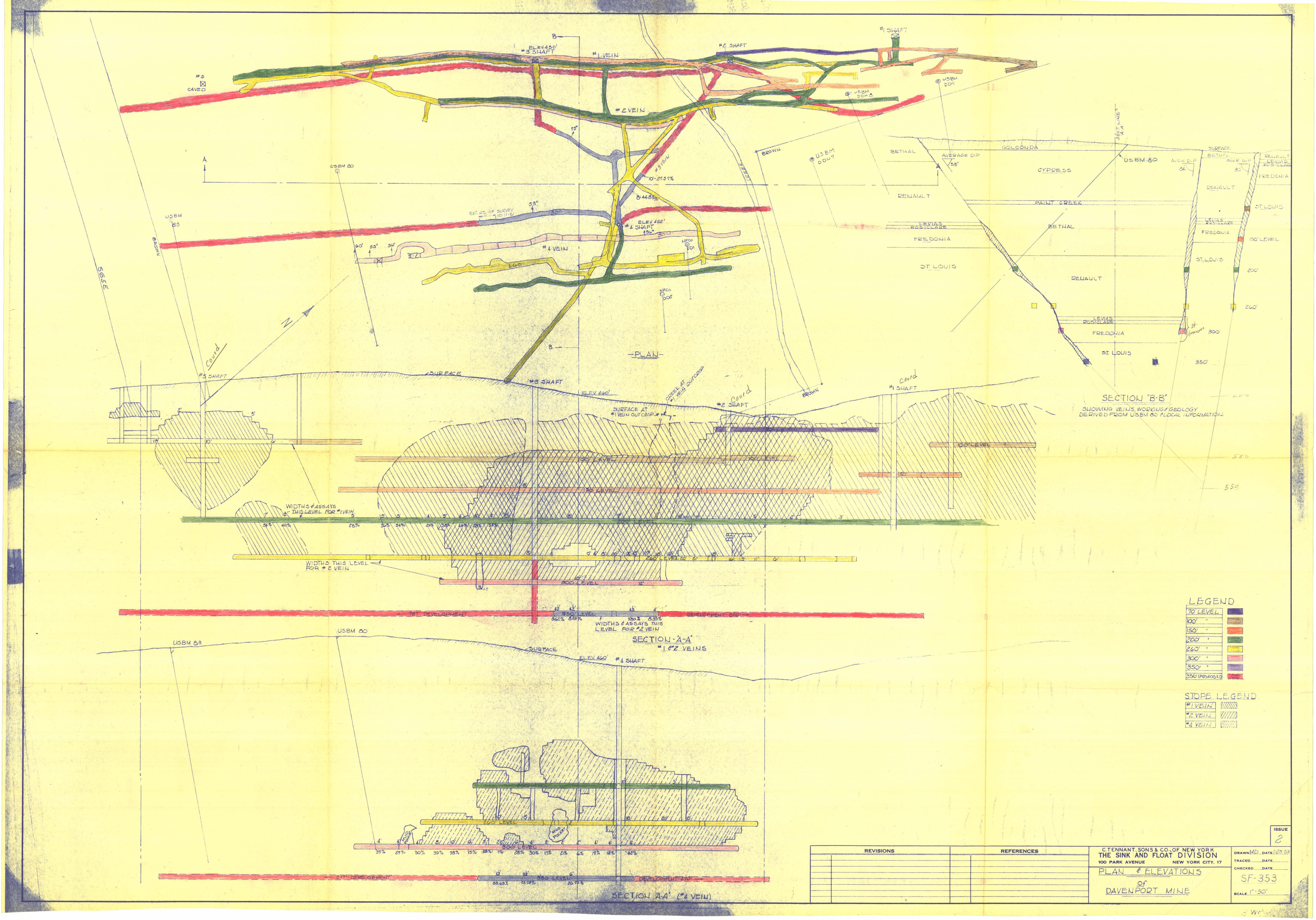
NOTE:
* PRESENT EQUIPMENT

REVISIONS	REFERENCES

C. TENNANT, SONS & CO. OF NEW YORK
THE SINK AND FLOAT DIVISION
100 PARK AVENUE NEW YORK CITY, 17

FLOWSHEET
DAVENPORT MINES

ISSUE I
DRAWN R.D. DATE 11-1-52
TRACED DATE
CHECKED DATE 11-12-52
SF 333
SCALE Do Not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#1 VEIN
#2 VEIN
#4 VEIN
#1 SHAFT
#2 SHAFT
#3 SHAFT
#4 SHAFT
#5 CAVED
ELEV. 450'
ELEV. 458'
ELEV. 460'
USBM 80
USBM 83
USBM DDH 1
USBM DDH 3
USBM DDH 7
BROWN
S65E
N
SURFACE
SURFACE AT #1 VEIN OUTCROP
CREEK AT #1 VEIN OUTCROP
WIDTHS & ASSAYS THIS LEVEL FOR #1 VEIN
WIDTHS THIS LEVEL FOR #2 VEIN
WIDTHS & ASSAYS THIS LEVEL FOR #2 VEIN
70' LEVEL
100' LEVEL
150' LEVEL
200' LEVEL
260' LEVEL
300' LEVEL
350' LEVEL
78' DEVELOPMENT
DEVELOPMENT 350'
SECTION -A-A'
#1 & #2 VEINS
SECTION A-A' (#4 VEIN)
MUD POCKET
SECTION "B-B"
SHOWING VEINS, WORKINGS & GEOLOGY
DERIVED FROM USBM & LOCAL INFORMATION
GOLCONDA
BETHAL
AVERAGE DIP
CYPRESS
RENAULT
PAINT CREEK
LEVIAS
ROSICLARE
FREDONIA
ST. LOUIS
SURFACE
SEE LINE A-A
LEGEND
70' LEVEL
100' "
150' "
200' "
260' "
300' "
350' "
350' (PROPOSED)
STOPE LEGEND
#1 VEIN
#2 VEIN
#4 VEIN
REVISIONS
REFERENCES
C. TENNANT, SONS & CO. OF NEW YORK
THE SINK AND FLOAT DIVISION
100 PARK AVENUE
NEW YORK CITY, 17
PLAN & ELEVATIONS
OF
DAVENPORT MINE
DRAWN MD DATE 12-8-53
TRACED DATE
CHECKED DATE
SF-353
SCALE 1"=50'
ISSUE 2